Distr.
LIMITED

UNIDO/IO.615
22 April 1985

UNITED NATIONS
INDUSTRIAL DEVELOPMENT ORGANIZATION

ENGLISH

PROCEEDINGS OF THE WORKSHOP ON THE PHARMACEUTICAL INDUSTRY (COMBINED MODERN-TRADITIONAL PHARMACY) FOR PROMOTING TECHNICAL CO-OPERATION AMONG THE DEVELOPING COUNTRIES

Beijing and Hangzhou, China
1-14 November 1982

Technical papers

Part Two*

*Part one of this document has been issued under the symbol UNIDO/IO.614.

V.85-25315
2273T
2274T

Preface

The Workshop on the Pharmaceutical Industry (combined modern-traditional pharmacy) for Promoting Technical Co-operation among the Developing Countries, held in Beijing and Hanzhou, 1-14 November 1982, was jointly organized by the Government of the People's Republic of China and the United Nations Industrial Development Organization (UNIDO) and was intended to extend the benefit of Chinese experience in this field to other developing countries.

At this Workshop, several participants made formal presentations reviewing the position in their respective countries. This document contains these reviews, which give some idea of the interest and commitment of several developing countries towards making use of traditional pharmacopoeias and exposing these traditional methods to the influence of modern science and technology to make them more widely applicable in the present-day context.

Part one of the report on this Workshop, which contains seven papers presented by experts from the host country, China, and one contribution from the UNIDO secretariat, has already been issued under the document symbol UNIDO/IO.614.

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DEVELOPMENT AND PRODUCTION OF TRADITIONAL MEDICINE IN BANGLADESH

By Muhammad Abdul Matin*

Introduction

Bangladesh has a rich supply of herbs, and medicinal plants grow in abundance in most parts of the country. More than 400 medicinal plants are found in Bangladesh and are widely used by the people. The traditional medicine using these medicinal plants is the Ayurvedic and Unani system of medicine which has been used by most of the people of this region for more than 3,000 years. This Ayurvedic system originated from the Veda and was first contained in Soma a part of Veda. The ascetics and saints first described the use of herbs along with dosage, process of home preparation, and efficacy in Soma between 4,500 and 3,600 years ago. Charaka and Susrutha further developed and elaborated the use of herbs which became almost an integral part of the culture of the people of this region.

At present, about 5,000 skilled practitioners, who have acquired knowledge through years of experience and some of whom also have an education from the Board of the Ayurvedic and Unani System of Medicine, are engaged in the practice of this system of medicine. About sixteen producers manufacture Ayurvedic drugs in distillery plants without modern technology and without equipment for quality control. The Ayurvedic and Unani system takes care of 60-70 per cent of the population of Bangladesh. It is clear therefore that it is important in the medical care currently available to the people, an analysis of which and its future possibilities are given in the following sections.

The pharmaceutical situation in Bangladesh

The country's yearly import bill for drugs and medicines is 1,450 million taka (Tk).** Of this amount, Tk 1,200 million goes for the import of raw materials (basic and fine chemicals, biochemicals and packing materials) for local production of finished products, and the remaining Tk 250 million is spent on the import of finished products. All the drugs resulting from this expenditure can only cater for the needs of 20 per cent of the population. The remaining 80 per cent of the population remains beyond the reach of modern medicine. However, the Government's medical care programme, which includes the setting up of health complexes at various levels and aims to provide medication for everybody by 2000 A.D., has vastly increased the sphere of modern medicine. By the closing year of the second five-year plan (1985), when most of the Thana Health Complexes will start functioning, essential drugs worth Tk 800 million (Tk 700 million for primary health care and Tk 100 million for population control at 1972-1973 prices) will be required to supply them. This is a staggering figure when compared to the present requirement of the Government for primary health care which is Tk 120 million.

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*Albert David (Bangladesh) Ltd., Tejgaon Industrial Area, Dacca, Bangladesh.

**The monetary unit in Bangladesh is the taka (Tk). At the time of this Workshop, the value of the taka in relation to the United States dollar was $US 1 = Tk 22.62.

To supply peripheral services and medical colleges with drugs, an additional amount of Tk 800 million (at 1972-1973 prices) would be needed. At present, the Government spends Tk 180 million for drugs and medicines for all its services while the cost of the drug requirement in the private sector is Tk 1,450 million. In 1985, when the Government's requirement will amount to Tk 1,600 million, the private sector requirement will certainly increase to Tk 2,000 million, if not more. So the total cost of the drugs required by the nation at the end of the second five-year plan (1985) will be about Tk 3,000-3,500 million. If industries to process basic and fine chemicals and fermentation plants for the production of different types of antibiotics are not installed, the whole quantity of drugs and medicines will have to be imported either in the form of pharmaceutical raw materials or finished products at a huge cost in hard-earned foreign exchange. The amount would definitely be around several hundred million taka. This near-absolute dependence of the nation on foreign countries for drugs and medicines affects the people in two ways. Firstly, it drains away a sizeable portion of our hard-earned foreign exchange. Secondly, delayed shipment of pharmaceutical raw materials from abroad seriously disrupts the production of drugs in the country which in turn destabilizes the drug market.

To attain self-sufficiency in drugs and medicines, which means a nearly-complete substitution of the imported pharmaceutical raw materials and finished products, a number of steps have to be taken simultaneously. These steps are (a) the setting up of industries for the production of basic and fine chemicals, the installation of fermentation plants for the production of antibiotics and the establishment of manufacturing units for processing these chemicals into finished drugs in both public and private sectors, (b) concerted efforts towards producing herbal medicine by scientific methods and attempts to popularize it, (c) implementing a plan to evaluate scientifically the efficacy and toxicity of traditional medicines and to increase their production.

The Government has prepared a plan for setting up a plant for the production of synthetic chemicals (basic and fine chemicals) and a plant for the production of antibiotics at a cost of Tk 600 million and Tk 1,600 million respectively. They have also prepared a plan for four manufacturing units, one in each division of the country, which will produce 12 essential drugs for village-level health care and 33 essential drugs to feed the Thana Health Complexes. The units will have cost Tk 900 million when completed and they will produce drugs worth Tk 700 million annually, at 1972-1973 price levels. If the plan to begin production of basic chemicals and antibiotics is not implemented, the country's dependence, in at least two vital items (antibiotics and vitamins), is likely to continue indefinitely. If at least some of the drugs and medicines are not produced in the public sector as suggested, the whole medical care programme will suffer seriously because of lack of essential drugs in the health complexes. If all the drugs required in the country are produced in the private sector, there would be minimum control by the Government of the supply and pricing conditions of these items.

<u>The development of traditional medicine and its potentials</u>

The second necessary step in Bangladesh would be the scientific production of herbal medicine, which has a tremendous potential, and a programme to popularize it. Apart from its scientific interest, this approach has become an economic necessity for a poor country like this one. Herbal or traditional medicine would cost the nation and the consumers much less than

its modern counterpart. The potential of herbal medicine lies in its good therapeutic efficiency, confirmed by recent reassessments, and in its abundance. The country has a good repository of herbs and plants with medicinal value. In fact, the reputation of this dates back to the vedic era. Susrutha and Charaka, the famous surgeon and physician respectively of that time, used these plants for the treatment of many diseases. The Ayurvedic medicine is based upon the works of scholars in this field. In a true sense, the foundation of modern medicine is laid on the basis of herbal medicine and its subsequent developments. With the progress of science and technology, scientists have isolated hundreds of active principles from the herbs and plants. At the initial stage, such isolation and extraction were the prime source of modern medicines. But, for economic reasons, the extraction of drugs from nature has been replaced by synthesis in the laboratory. In addition to synthesizing the naturally-occurring drug molecules, their synthetic analogues have gradually come out. With the invention of more sophisticated instruments and equipment, the studies on drug macromolecule and drug-receptor interactions have become possible. As a result, ideas about the nature of the structure necessary for the drug's pharmaceutical action have become clearer. Using this information, modern synthetic pharmaceutical chemists are designing and synthesizing drugs quite independently of nature's model or natural products. This has both advantages and disadvantages.

The advantages of the synthetic method are that one can produce numerous analogues whereas nature produces only a limited number of analogues of each compound or drug, and also that a particular type of drug can be produced in bulk quantity at a cheaper price than that of the extracted material. The disadvantages are that, out of thousands of such synthesized molecules, only a few are found to be active and that synthetic drugs, i.e. synthetic and semi-synthetic analogues, are more toxic in most cases than their natural counterparts. Moreover recent discoveries of hitherto unisolatable drugs from natural sources offer hope for new remedies. Considering these and many other factors, scientists all over the world have started a reassessment of herbs and plants as medicines. Even before the reassessment is completed, one can safely say that natural products such as reserpine from Rauwolfia serpentina, an anti-hypertensive drug, morphine, a sedative and psychotropic drug, digitalis, a drug used in heart disease, emetine, an anti-amoebic drug, quinine, an anti-malarial drug, vincristine and vinblastine, anti-cancer drugs and many other plant-derived products still dominate the drug scene. Herbal medicines, though not the same as the drugs discussed above, nevertheless definitely contain similar types of potent ingredients in their extracts. Under the present circumstances, the medicinal herbs and plants of the country should be seriously studied and their therapeutic efficacy be determined. There are numerous plants in the country which have reported anti-fertility, anti-diarrhoeal, anti-tubercular, anti-cancer, anti-malarial, anti-viral, anti-pyretic, and anti-arthritic actions and broad-spectrum antibiotic principles. Some scientific work has been done on the plants of the sub-continent in universities and research laboratories. Only very limited studies have been conducted in this country. All these studies both at home and abroad are not very exhaustive. The majority of the work so far reported in literature was conducted in the 1950s, 1960s and 1970s. Since then there has been a tremendous development in the methods of extraction and isolation and a serious scientific study of identification methods. With modern methods of isolation, extraction, identification and biological testing, plants and herbs could give us hitherto-unknown drugs. A simple example of such a discovery is the isolation of hordenine, a broad-spectrum antibiotic principle, from bel fruit (Aegle marmelos). Most people in this subcontinent

know that bel fruit relieves the symptoms of dysentery but until recently the antibiotic principle which not only relieves symptoms but also the disease was not known.

Many other medicinal plants have been widely used in Bangladesh, such as:

(a) Treebine (Cissus quadrangularis) for healing fractures of bone and for control of hyperlipidaemia and its complications;

(b) Telakucha (Coccina indica) for anti-diabetic properties;

(c) Garlic (Allium sativum) for control of hyper cholestrolemia and heart disease;

(d) Thorn apple (Datura stramonium) for antispasmodic action and dilation of the pupil of the eye;

(e) Spiderling (Boerhaavia repens) for diuresis and urinary diseases;

(f) Dita tree (Alstonia scholaris) for anti-malarial action;

(g) Papaya (Carica papaya) contains papain for digestion and its juice is effective for expulsion of worms;

(h) Sweet gourd (Cucurbita maxima) seeds for anthelmintic properties;

(i) Abroma (Abroma augusta) for menstrual irregularities;

(j) Malabar nut (Adhatoda vasica) for cough remedy;

(k) Onion (Allium cepa) for anti-diabetic and aphrodisiac properties;

(l) Creat (Andrographis paniculata nees) for hepatitis;

(m) Prickly poppy (Argemone mexicana) for dropsy and jaundice;

(n) Asparagus (Asparagus recemosus) for diabetis;

(o) Neem tree (Azadirachta indica) as antibacterial, anthelmintic and antipyretic.

Obviously fruits like Amlaki (Phyllanthus emblica) and Guava (Psidium guajava), very rich in vitamin C, are grown in abundance in our country.

The major outcome of serious herbal research should be both the discovery of new drugs in a pure form which can be used as modern medicine and also the evaluation of herbal medicine as such i.e. after the basic treatments of purification and stabilization, the crude extracts should be tested for activity. If found active, they could be put into general use after proper trials in human subjects. These herbal medicines would relieve the pressure on supplies of imported modern medicines.

The drugs administration of our country does not authorize the formula of herbal medicines for production and subsequent release in the market, arguing that they cannot approve a medicine whose ingredients are not properly known and whose standardization and assay procedures are not well established. It is true that standardization and quality-control checks are very difficult in

the case of herbal medicines. It is also true that the stability of these drugs has not been properly studied. But there is an easy way out of these problems. The standardization and the quality-control checks can be performed by bio-assay on animals and micro-organisms rather than by chemical means which is very complicated with this class of medicine. If a herbal preparation gives a consistent result in animal and human trial then there should not be any valid reason why it should not be passed by the authority concerned. The other two methods of assay which can also be applied in this class of medicines are (a) the determination of total alkaloids, glycosides, tannins or steroids whichever the case may be, for a single plant, and (b) the determination of ash content of the preparation. These parameters will also reveal the amount of active constituents in the herbal preparation. But the other vital factor which should also be considered in the mass production of herbal drugs is their deterioration or change to other compounds when stored. In the crude drug, such instability is frequently encountered. If the crude drugs are reasonably purified by simple methods of extraction and isolation, the stability of the herbal drug could be improved. When these difficulties have been overcome, pharmaceutical manufacturers can be given the signal for the mass production of herbal medicines, the traditional medicine.

The Ayurvedic and Unani system of medicine has always played a vital role in our country. Only recently, the World Health Organization (WHO) has started to give serious consideration to it. For economic reasons and because of the rediscovery of its therapeutic efficacy, the popularity of traditional medicine is on the increase again in many countries, and in many countries this system of medication has been tremendously improved by further scientific research. This research primarily consists of experimental pharmacological research and chemical analysis. By these methods, traditional medicines which tend to be toxic are screened out and the useful ones are selected for mass use. Scientific research upgrades the traditional medicine to herbal medicine which can then be integrated with modern medicine. Some countries have already in many respects integrated their traditional medicine with their modern medicine. A qualitative and quantitative improvement in the traditional medicines of Bangladesh could be brought about by scientific research. The first step should be the screening of medicinal plants based on the preparation of traditional medicines for their efficacy as well as for their toxicity. There should be regulations for the administration of such drugs which should also ensure a guarantee of quality with some scientific basis, though not on the scale of quality control in modern medicine.

In Bangladesh, some research work has already been done on isolating the active principles of anti-fertility from Dioscorea roots, anti-diabetic properties from Coccina indica and anthelmintic factors from different herbs. Research workers of Dacca University, Institute of Post-graduate Medicine and Research, Bangladesh Council of Scientific and Industrial Research and the Medical Research Council have undertaken projects to isolate active principles from different medicinal plants for clinical use among the population as mentioned before.

All the manufacturers of Ayurvedic and Unani medicines here follow the same home-made process which has been used for centuries. This includes herbal concoction from different herbs and compounding and preparation of tablets and other forms of medicaments. There is no modern equipment for quality control of these preparations, or for packaging. These manufacturers market their products through a number of shops located in cities, towns and bazaars.

Recommendations

1. In order to make available medicinal herbs suitable for wide use, a comprehensive study to identify available plants on the basis of therapeutic efficiency and toxic effects should be undertaken and a pharmacopoiea of medicinal plants with therapeutic use, dosage and processing be compiled.

2. An extensive programme to cultivate selected herbs and medicinal plants which have been found effective against disease should be implemented. This programme will enable people to grow medicinal herbs in villages in different parts of the country according to local soil conditions and other ecological factors.

3. There is a real need to develop a means of preserving the quality and therapeutic value of medicinal herbs before processing them into finished products so that the therapeutic value is not lost during long storage.

4. A process should also be developed to protect the therapeutic value and clinical efficacy of the end products from deterioration and loss of potency during prolonged shelf life.

5. As medicinal plants grow in abundance in Bangladesh, a herbal research institute could be set up to find out which alkaloids are effective in specific diseases and to confirm dosage in specific disease because herbal medicines provide total treatment without much side effect or toxic effect as compared to their modern counterparts.

6. To encourage the further dissemination and use of herbal medicines, this subject should be incorporated into the curriculum of the different medical colleges in Bangladesh.

PROMOTION OF TRADITIONAL MEDICINE IN BURUNDI

By Baza Anaclet*

Introduction

Although the basic medical health infrastructures are adequate, the majority of the rural population resort to traditional healers scattered throughout rural areas. The rural people describe the symptoms of the illness from which they suffer, the healer listens carefully and gives them a medicine, orally explaining the method of administration and dosage. Quite often the healer accompanies the prescription with magical rites. In other cases, commonly-used traditional medicines are sold in the markets.

In general, modern and traditional medicine co-exist peacefully and in complementary fashion.

Evolution of traditional medicine

In the colonial era, as any initiative not issuing from the colonial authorities was frowned upon, the exercise of traditional medicine was prohibited and presented to the population as a manifestation of the devil. Any mishap or failure of modern medicine was attributed to native medicines secretly taken by the patient.

With the coming of independence in 1962, the situation changed and the exercise of traditional medicine was officially tolerated and rehabilitated. About 10 years ago, the Government took positive action in recognizing traditional medicine. It encouraged private initiatives, for example, by financing the construction of a dispensary for traditional medicine run by nuns. In this dispensary for traditional medicine, located 100 metres from a dispensary for modern medicine, the nuns carried out treatments exclusively with plants which they gathered in various parts of the region. They were consulted by patients with psychosomatic ailments and gynaecological problems, particularly women who were unable to have children or wished to have children of the other sex. Traditional medicine was no longer an activity of the devil since it was officially practised by nuns.

Since the establishment of the Second Republic on 1 November 1976, the Government of the Second Republic has not confined itself to this rather passive and timid attitude towards traditional medicine. Indeed the promotion of traditional medicine is an integral part of the objectives of the health policy of the country. The first congress of the Union of National Progress party, held in December 1979, recommended that traditional medicine should be developed in order to safeguard the cultural heritage and to put medicines of unimpeachable quality within the reach of the population.

Government actions in the field of traditional medicine

The Government of the Second Republic, at the end of 1977, was host to a team of UNIDO experts. As a result of the team's recommendations, in agreement with the Government, UNIDO sent other Romanian analysts and technicians as experts to Burundi. The experts, in collaboration with local staff and within existing infrastructures, endeavoured to:

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*Director of the Health Logistics Department, Bujumbura, Burundi.

(a) Establish a laboratory for analysing medicinal plants and extracting the active principles with a view to making it possible for a number of plant species to be put to use and processed into medicinal products which could be administered in a therapeutically-appropriate form;

(b) Develop industrial technologies for the pharmaceutical products obtained in the laboratory.

These experts identified many medicinal species amongst wild flora, carried out qualitative and quantitative analyses and prepared more than 30 products in various galenic forms.

The Government, aware that the potential of wild flora is very rich but is not yet being utilized on a scientific basis, is currently seeking ways and means of setting up an institute for research into medicinal plants. This research is essential because of the following factors peculiar to Burundi:

(a) Few plants are to be found among the medicinal plants described in the pharmacopoeias;

(b) A few plants are species related to ones described in the pharmacopoeias but would need to be analysed in order to determine their toxicity and precise pharmacodynamic action;

(c) The great majority of medicinal plants used by healers have not yet been studied.

The first difficulty encountered in making an inventory of traditional drugs is the lack of collaboration by traditional healers. They almost never reveal their secrets. Certain healers even refuse to give census information. In order to counteract this situation, the Government would like to promote and encourage associations of practitioners of traditional medicine.

The second and by far the more significant difficulty is finding staff trained in this type of research. The approach to this problem must be multidisciplinary because the staff required for this research are involved in many sectors of national life; education, public health, agriculture, industry etc. It is particularly hoped that UNIDO will help with training the different types of staff involved in research into medicinal plants.

DEVELOPMENT OF TRADITIONAL MEDICINE IN KENYA

By Philip H. A. Nandy*

Introduction

Traditional medicine, as currently practised in most developing countries, makes use of medicaments prepared from materials derived from the immense natural resources of the world. In contrast to modern medicine, traditional medicine is based primarily on observation and on the personal experience of the individual herbalist. Moreover, it is deeply rooted in the socio-cultural context and above all in the ethical and metaphysical convictions of the peoples of the countries in which it is practised.

Developing countries, of which Kenya is one, are faced with the task of providing adequate and accessible health-care facilities with the limited financial, physical and manpower resources available. Traditionally, societies have always had ways and methods of providing every individual in the community with essential health care through acceptable and accessible means and at a reasonably affordable cost. This was due to the full utilization of indigenous resources, using products of plant or animal or mineral origin which were believed or had been proved to have therapeutic value.

Traditional medicine is practised by all the ethnic groups in Kenya, both in rural and urban settings. Despite the efforts of the Kenyan Government to provide scientifically-oriented health care to as many communities as possible, the traditional medical system has continued to thrive within these same communities. The two systems of health care co-exist and sometimes complement one another. Concern, however, has been expressed about:

(a) The potential hazards and possible economic wastage connected with the empirical use of traditional drugs without first establishing their efficacy and safety;

(b) The concurrent application of both systems of health-care delivery.

The National Council for Science and Technology in liaison with the Ministry of Health, the University of Nairobi and other agencies is currently doing a preliminary review to establish the present status of knowledge on traditional medicine in the Kenyan context. This review aims at achieving substantial progress in:

(a) Reviewing the current objective knowledge on traditional medicaments;

(b) Laying the groundwork for the establishment of a more systematic, scientific approach to the understanding of traditional medicine.

In the following sections of this account of the development of traditional medicine in Kenya, an attempt will be made to summarize:

(a) The present knowledge and practice of traditional medicine and its contribution in the overall national health-care delivery system;

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*Department of Pharmacy, Chief Pharmacist Office, Ministry of Health, Nairobi, Kenya.

(b) Systematic scientific research on traditional medication;

(c) The future of traditional medicine in the developing countries and trends in the industrialized world.

Traditional medicine and the national health-care delivery policy

It can be argued that, in eastern and central Africa, Kenya has perhaps the best primary health-care delivery system in terms of resources and infrastructure. However, studies have revealed that, in almost every community, traditional medical practice continues to thrive in co-existence with modern medical practice. It has been shown that psycho-social, socio-cultural and socio-economic factors play significant roles in the perpetuation of traditional medical practice amongst the various ethnic societies.

According to many cultural beliefs, disease does not just attack man at random. Even in cases where it may be scientifically proved that the patient has had viral or bacterial infection, the question remains as to why the agent should attack Mr. X and not Mr. Y, although sometimes the two people may be living within the same or similar physical environment. There must be a reason based on the socio-cultural environment of the victim. The appeasement of the gods and his ancestors must therefore be performed before the victim is cleansed of the affliction in the form of disease. Not all remedies applied in traditional medical practice are beneficial. Quite a few have actually been considered dangerous and have had adverse effects on the people to whom these agents have been applied. Some practices, however, are useful and could be adopted, with appropriate adjustment, to fit in the overall health-care system.

Co-ordinated and systematic research is lacking. Apart from preliminary analysis of the medical composition of the herbs used by traditional medical practitioners, very little research has been carried out in Kenya to elicit overall information about the diagnostic and therapeutic procedures which are the essence of traditional medical practice. Many of these procedures have nothing to do with the application of medication, herbal or otherwise, to the patient. They cover the whole spectrum of psycho-social and socio-cultural concepts of illness.

For purposes of control, indigenous medical practitioners require to be registered in the same way as the scientific medical practitioner is registered in Kenya, and for purposes of policy-making and health planning it would be necessary to discover whether there are any points of contact, or areas of interaction and levels of co-operation existing between the two systems so that strategies towards full use of this health-care resource can be formulated.

Such a project has just been carried out by the Department of Community Health in the University of Nairobi. The data gathered so far deals mainly with the socio-cultural and socio-economic significance of the use of African traditional medicine among selected communities in Kenya. A lot more needs to be done in encouraging further studies to map the potential merits and actual use of traditional medical resources and to integrate it with scientific medicine.

Organization of systematic research on traditional medical practice

As stated earlier, there is a great lack of co-ordinated and systematic scientific research on traditional medical practice in Kenya. However, there

exist two levels of applied scientific research organization:

(a) Individual, isolated initiatives;

(b) The national research programme.

Individual, isolated initiatives. These research programmes are carried out both by isolated research workers and by teams that do not meet all the desirable requirements for multidisciplinary research. They merely carry out information gathering and data-collection exercises and gather medicinal plants on the spot. In most cases, phytochemistry remains their predominant concern. It is a pity that these researchers and teams cannot come together and co-ordinate to form a multidisciplinary force. Many notable personalities such as Prof. Maitai of the School of Pharmacy, Dr. Mugo of the Biochemistry Department and Prof. Kokwaro of the Department of Botany in the University of Nairobi are leading researchers in this field. Mrs. V. N. Kimani of the Department of Community Health, University of Nairobi and Mr. Mulavo and Mr. Osore of the National Council for Science and Technology are also recognized workers in this field.

The national research programmes. These exist in Kenya, as indeed in many developing countries, alongside private and individual initiatives. They come within the framework of national plans for economic and industrial development. In Kenya, such plans are drawn up by the National Council for Science and Technology under the auspices of the Ministry of Health. This body has attempted to initiate systematic and co-ordinated research on traditional medicine but has not succeeded in involving the individuals mentioned above. There is a need, therefore, for inter-disciplinary co-ordination as far as private and individual initiatives are concerned.

The role of the National Council for Science and Technology although obviously including the co-ordination of scientific research, does not seem to be clearly defined at the national level and is often disregarded. Attempts should therefore be made at co-ordination on a regional level within the country. Symposia and multidisciplinary meetings of various separate governmental institutions could be usefully extended in purely technical fields to set up an organization for applied research on traditional medicaments, which would undertake the formulation of a systematic methodology and of joint research programmes, the exchange of information and the training of scientific and technical staff.

The future of traditional medicine

Due to an increasing awareness of undesireable side effects and reactions to modern drugs and in view of the prohibitive cost of modern scientific medication, a renewed interest in and awareness of traditional medical practice is appearing both among the lowly and largely illiterate rural folk and the relatively affluent and highly-educated urban society. There is an increased desire to identify with the "natural". More and more emphasis is being brought to bear on regulation (individual and societal) of socio-cultural habits. A scheme, therefore, which attempts to integrate traditional and modern medical practices will in the long run improve the delivery of adequate and affordable health care to every community. To date such attempts have largely been disappointing due to:

(a) Lack of co-ordinated multidisciplinary research programme on traditional medicine;

(b) Mutual distrust between the proponents of these two systems of health delivery.

Individuals in most Kenyan societies practise or are accessible to both systems of health delivery. Where one system fails in providing successful therapy for a particular condition, it is not strange but is rather a natural development that the patient automatically consults the other system. Quite often both systems are consulted from the outset. This development has largely frustrated the Government's effort to deliver modern health care to all by the end of this decade. Health delivery is practically free for Kenyan nationals. This, however, does not discourage ordinary individuals from paying the relatively exhorbitant fees charged by some traditional practitioners.

Another shortcoming, often experienced, of the government policy on health is the lack of adequate drug supplies or irregular supplies of the same in the primary health units. There is also a disproportionate distribution of trained and skilled manpower with the majority of these concentrated in the urban areas. Thus, the bulk of the population, who are living in the rural areas, make ready use of traditional medicine which is easily accessible and invariably affordable.

Traditional medical practice is here to stay and may even develop further. Such development should however be scientifically co-ordinated, and efforts to advance the integration of this system with contemporary medicine should be encouraged.

USE OF HERBAL MEDICINE IN HEALTH CARE AND IN TRADITIONAL MEDICINE IN MALAYSIA

By Liew Kee Hooi*

Introduction

Malaysia has a population of 13.4 million (based on the 1980 census) in which there are people of three main ethnic origins, the Malay, the Chinese and the Indian. The proportions of these ethnic groups in the population are approximately 46.8 per cent Malay, 34.1 per cent Chinese, 9.0 per cent Indian and 10.1 per cent others.

Among these ethnic groups, various traditional or native systems of medicine are being practised and the following types of traditional healers can be found:

(a) The Malay bomoh, dukun or pawang;

(b) The Chinese sinseh;

(c) The Indian ayurvedic or homeopathic practitioner.

Practice of traditional systems of medicine

The traditional medicine practitioners or healers are of two types:

(a) The type that does not use plant products but uses systems of prayers and incantations, sometimes over water or paper and after that the patient drinks the water or burns the paper and drinks water with the ashes. Others operate by supplying various small articles to be worn on the patient's body to cure and relieve. There are those who cast spells to effect cures and others place their hands over the affected parts and chant incantations;

(b) The type which uses either plant products that they collect and process themselves or those herbal products that are now manufactured and distributed on a large scale by various companies.

At present, a system of traditional healers or "medicine men" exists parallel to western medicine in the country. Due to the circumstances of the social and economic development of this country, the more literate sections of the community mainly consult western medical practitioners whilst a higher proportion of the less literate consult the traditional healers. The policy in this area is one of tolerance and freedom of choice by the patients of either system in the private sector but in the public sector, only the western type of medical practitioner is available. Though there has been no attempt to integrate the two systems, the traditional medicine men are allowed to practise their calling but are covered by legislation which limits their activity. They are allowed to use medicinal plants as medicine either in the form of leaves, roots or bark or finished dosage forms as long as these do not contain any dangerous drugs or poisons which are controlled by the Dangerous Drugs Act or the Poisons Ordinance. Thus traditional healers are allowed to practise their traditional types of medicine which may be of value in primary health care in the rural areas so long as they do not contravene any of the

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*Chemist, Ministry of Health, Government of Malaysia.

existing legislation pertaining to medical practice and the use of western medicines, drugs and poisons in the country. However, it is here that problems have been encountered and instances of contravention are becoming more frequent resulting in misleading the public and creating seriousconsequences when potent western drugs are used by untrained people. Some of these problems are:

(a) The use of titles and words which are restricted for use by registered western medical practitioners under the Medical Act, thereby misleading the public. Under the Medical Act, although the right of persons to practise systems of therapeutics according to purely Malay, Chinese, Indian or other native methods is not restricted, such native practitioners are not allowed to use the titles "physician", "doctor of medicine", "surgeon", "general practitioner" and are also not allowed to use any instruments calculated to induce any person to believe that he is qualified to practise medicine and surgery according to modern scientific methods. They are also not allowed to use words such as clinic, dispensary or hospital;

(b) The use of plant products which contain scheduled poisons controlled under the Dangerous Drugs Act and Poisons Ordinance. For example, powdered opium, belladonna, lobeline and reserpine which can only be used by registered medical practitioners;

(c) The use of non-plant material such as steroid preparations and antibiotics, which are also controlled items, being scheduled poisons;

(d) The use of ready-made herbal remedies which are mislabelled and contain various contaminants such as arsenic in quite high proportion or contain chemicals like steroids neither of which are declared on the labels. This has led to problems in public-health care and has been the cause of strong consumer reaction in the country;

(e) The advertising of skills or services relating to the treatment of any ailment, disease, injury, infirmity or condition affecting the human body which is prohibited by the Medicine (Advertisement and Sales) Ordinance. This prohibition covers both the western-trained and the traditional practitioner.

Research and development on plant-derived pharmaceuticals

Malaysia does not have any pharmaceutical industry manufacturing plant-derived pharmaceuticals. The traditional medicine practitioners, however, do carry out small-scale processing of plant products that they either collect or cultivate themselves, or of imported plant raw materials, into various finished dosage forms such as infusions, pills or powders. There is hardly any systematic evaluation or standardization being carried out for such preparations.

Research and development on plant-derived pharmaceuticals on a commercial scale is virtually non-existent. Research on medicinal plants is confined to institutions of higher learning and is of mostly academic interest. The School of Pharmaceutical Science at the Science University of Malaysia is conducting preliminary screening of some local plant products for their pharmacological activity but this is on a very limited scale. Some of the local plants which have undergone preliminary screening are:

Pechicellobium jeringa (buah jering)

Parkia speciosa (buah petai, nitta tree)

Work on aqueous extracts confirmed their hypoglycemic activity in both normal and alloxan-induced diabetic rats.

Orthosiphon stamineus (Java tea)

Aqueous extract demonstrated diuretic effect.

Averrhoa carambola (star fruit)

Investigation made on aqueous extract established the hypotensive effect.

Emblica pectinata (buah asam melaka)

Preliminary work indicated that the alcoholic extract of the leaves possessed hypotensive activity in anaesthetized rats.

Plumeria acuminata (frangipani)

Mimosa pudica (touch-me-not)

This has been associated with the treatment of asthma. Studies using water-soluble extract of both leaves and flowers indicated that both the extracts caused relaxation of the trachea and the intestinal smooth muscle of guinea pigs.

Melia indica brandis (Indian margosa tree)

Lawsonia alba (henna)

Tests carried out using bacteria culture revealed that aqueous extracts of the leaves are effective against colibacillus, streptococcus and aerobacter species which are mainly responsible for diarrhoea, sore throats and common ear infections.

Hibiscus rosa sinensis (China rose)

Isolation of the active principle, cyanidin-3 sophoroside of the anthocyanin group was found to be effective against colibacillus, Staphylococcus aureus, Bacillus subtilis and Proteus vulgaris. The active principle also showed marked but transient hypotensive effect in both normotensive and renal-hypertensive rats. The mode of action appeared to be similar to that of acetylcholine.

Conclusion

In many instances, herbal remedies are used by the traditional healer in symptomatic treatment of simple conditions like headache, stiff shoulders, gastritis etc. This may be of value in primary health care in the rural areas but would not be so advantageous or of benefit in a more urban setting. Nevertheless, these practitioners are practising in the urban areas more and more. In fact, a large number of the Chinese population all over the country consults such practitioners. In some cases they are prescribed the traditional mixture of Chinese herbs to be boiled and concentrated down, but, in many cases, Tetracycline or Prednisolone may be supplied. The increasing use of western chemical drugs by these practitioners adds to the problems of adverse drug reactions due to improper usage. There does appear to be a place

for the true traditional healer with his true herbal remedy but the problem arises for any developing country in trying to screen and evaluate the herbal remedies. Even if technical expertise is available, is the subject of a high-enough priority to commit to it these personnel, who might be needed more in other areas of the country's endeavours? Identification, screening, evaluation and standardizing of such products on a systematic scale could well be undertaken by large multinational pharmaceutical companies and such efforts in the developing countries could be an additional contribution by the developed countries to implementing the resolution on tropical diseases adopted by the World Health Assembly.

The approach involving developing standards of acceptable safety rather than of efficacy of a certain number of plant products should be pursued and Malaysia would benefit from this as the plant material used by the native practitioner would be of a standard that ensures freedom from contamination or at least limits the contamination to the ultimate benefit of the consumer. But there would have to be suitable legislation for regulating the use of these standardized products. It appears that whilst some countries allow any product to be used by these practitioners, in others, products considered as scheduled poisons e.g. belladonna, opium, rauwolfia, are not allowed to be used by such practitioners, who may only use plant products that do not contain any scheduled poisons. From this point of view, it would be an advantage if, parallel to the development of a list of standardized plant products, there could also be carried out an inter-country study comparing aspects of the regulation of use of medicinal plants, of the practitioners, their training and their ability to be able to usefully administer these products. Based on the outcome of such a study and any recommendations that may be made, countries in the region which do not yet have a formal national policy in this field could evolve one in the interest of better health care for their peoples.

DEVELOPMENT AND UTILIZATION OF MEDICINAL PLANTS IN NEPAL

By S. B. Malla and A. D. Shrestha*

Introduction

The Kingdom of Nepal lies in the central Himalayan region, between China and India. Nepal occupies one-third of the entire length of the Himalayan range with an area of 147,141 square kilometres, extending east to west for approximately 830 kilometres whereas its north to south width rarely exceeds 200 kilometres. Within such a short north-south span of distance, there are remarkable variations in altitude which ranges from a mere 50 metres above sea level in the south to well over 8,000 metres at the northern crest line. It includes the flat land known as the Terai in the south, the central hilly zone and the mountains in the north.

The diversity of physiography caused by the altitudinal variations and climatic fluctuations has greatly contributed towards rich distribution of vegetation in different areas of Nepal which adequately represent floras of tropical, sub-tropical, temperate and alpine zones. The medicinal plants so far enumerated by the Department of Medicinal Plants, who are compiling information on plants that are being used in Ayurveda, the traditional system of medicine, many of which are also included in the pharmacopoeias, include well over 700 different species of herbal medicines out of an estimated 7,000 higher plants in Nepal. The distribution has been found to be approximately 31 per cent in the tropical and sub-tropical region, 55 per cent in the temperate and 14 per cent in the alpine regions.

Present situation of Ayurvedic, traditional and modern medicines

The traditional system of medicine has been practised in Nepal from ancient times. These days, about 80 per cent of the people still benefit from this system of medicine. In remote areas, traditional medicine is the basic health care of the people and the practitioners themselves manufacture and distribute the medicines. There are quite a few noted manufacturers of Ayurvedic medicines in the private sector and in t e Government sector. The private manufacturers are quite small. Singh Durbar Vaidya Khana is the only leading manufacturer of Ayurvedic medicine under the Department of Ayurveda, of the Government of Nepal. The preparations are based mainly on substances of vegetable, mineral and animal origin as in the Ayurvedic pharmacopoeias. Singh Durbar Vaidya Khana manufactures and distributes the medicines to 85 Ayurvedic hospitals and health centres situated in different parts of the country. In addition, Ayurvedic drugs worth about $US 1 million per annum are also being imported from India.

In 1965, for the first time in Nepal, the Production Unit of the Royal Drug Research Laboratory in the Department of Medicinal Plants started a pilot scheme for producing modern medicines. As the technical know-how for the manufacture of medicines grew, the products became popular, confidence increased in their quality and reliability and their price was low as compared to imported drugs. In 1972, the Production Unit was converted into a public company under the name, Royal Drugs Limited. At present, Royal Drugs Limited produces 80 different formulations of about 60 basic drugs. Apart from that,

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*Department of Medicinal Plants, Ministry of Forests and Soil Conservation, Thapathali, Kathmandu, Nepal.

herbal products like vasaka extract, aconite extract, belladonna extract, menthol turpentine and essential oils are also produced. Efforts are also being made to introduce new formulations based on established medicinal plants. So far many of the basic chemicals required for them are imported from abroad. This company is well equipped with a quality-control laboratory.

In 1981/82, Royal Drugs Limited produced and marketed drugs worth $US 1.2 million. It is envisaged that by the year 1985/86, 60 per cent of the essential drugs required in Nepal (at an approximate value of $US 4.5 million) will be produced and marketed in the country. The present total modern drugs requirement in Nepal is estimated to be $US 10 million.

Activity of the Department of Medicinal Plants

The Department of Medicinal Plants is a Government organization which is principally devoted to research, development and the utilization of the medicinal plants of Nepal. The department is engaged in:

(a) Conducting a complete survey of Nepalese flora;

(b) Maintaining representatives of this flora in the Herbarium and Botanical Garden;

(c) Cultivating commercially important medicinal plants;

(d) Developing and utilizing the country's herb and drug resources.

Working together in this endeavour are four main divisions of the Department.

The Royal Drug Research Laboratory. This Laboratory has been undertaking innovative drug research, especially on indigenous herbs, on their pharmacognostical identification, pharmacological action, and on technological developments for the production of pharmaceutical raw materials. Work on the improvement of the traditional herbal medicines is also being carried out. The laboratory also provides services in testing, standardization and quality control of drugs and allied products. This laboratory has been declared as the only national and official quality-control laboratory in the country, as provided for in the Nepal Drugs Act 1978/79.

Recently, the United Nations Development Programme (UNDP) and UNIDO have given help in strengthening this Royal Drug Research Laboratory and pilot plant in the production of pharmaceutical preparations based on the medicinal plants of the country. The main emphasis will be on upgrading the biological screening programme for medicinal herbs, pilot-plant extraction, formulation of doses and quality control and standardization of medicines.

The Botanical Survey and Herbarium. The Botanical Survey and Herbarium has been helping with the authentication of plants, besides collecting and maintaining the herbarium and the records of the country's flora. Studies on ecology and vegetation and the assessment of the availability of some of the important medicinal plants have been undertaken. Over 5,000 species of vascular plant specimens have been collected and properly preserved in the herbarium for study and reference purposes. This division produces publications on the flora of the country and also provides information and other services relating to work on the country's flora.

The Royal Botanical Garden, Godavari. This garden is being developed as a garden representative of the flora of Nepal. It has been a collecting centre for exotic varieties for varied research projects on cytogenetics, plant propagation through tissue culture, pathology, vegetation mapping etc. A germ-plasm centre for medicinal plants has also been established.

Herbal farms. Four of these have so far been established in different agroclimatic zones of the country. They have been engaged in exploiting the breeding potentialities of medicinal plants. Their activities are now confined to some of the selected species of medicinal plants which can attain optimum growth under the varied climatic and altitudinal conditions. In the high altitude farms, experiments on Aconitum, Pierorrhiza, Dioscorea, Atropa belladonna, Pyrethrum, Solanum and other species are being carried out and in the low-lying Terai, Rauwolfia serpentina, Claviceps purpurea, Nardus indica, Cimbopogon citratus, Palmarosa, Mentha and other species are being tested and cultivated.

Strategy for large-scale production and processing of medicinal plants

Recently, Nepal has been trading in medicinal plants with western countries, but it has also remained a leading supplier of herbs to the Indian sub-continent. It exports a wide range of crude herbs and drugs, worth over 3 million Nepalese rupees (NRs)*, without taking into account the export of spices such as cardamum, ginger, capsicum, garlic, turmeric etc. Well over 60 per cent of the total export of herbs is to India. As free trade with India takes place all along the Indo-Nepalese border, the exact volume of trade could not be ascertained. The figures collected from the customs offices for exports overseas and to other countries in Asia except India for the last eight years are graphically presented in the attached figure. The volume ranged from 85 tons** to nearly 400 tons** per annum and the highest volume of exports was recorded in the year 1976/77. The foreign exchange earned through exports ranged from NRs 3.8 million to NRs 12 million. The highest amount was during 1973/74. A very interesting fact that emerges from the figure is that the higher the volume of exports, the lower the value and vice versa, in most of the fiscal years except 1972/73 and 1973/74. This pattern in export trade indicates that higher-volume commodities bring in less income to the country. To reverse this trend, two alternatives are suggested: (a) to cultivate and collect selected materials which are low volume and high price and are therefore in high demand; or (b) export only the processed medicinal plants of all kinds.

In pursuit of these possibilities, the Government of Nepal has very recently established the Herb Production and Processing Company Limited in the public sector. The main aim of the new company is to initiate cultivation of herbs on a large scale, as well as collecting from wild sources, and to process the herbs. With the help of the Department of Medicinal Plants, the company will receive the necessary agrotechnology from the Herbal Farms for the cultivation of medicinal plants and the process technology from the pilot plant of the Royal Drugs Research Laboratory for extraction and production of intermediate products. The incentives to initiate the cultivation of herbs, especially by the small landholders, will be provided by loan agencies such as

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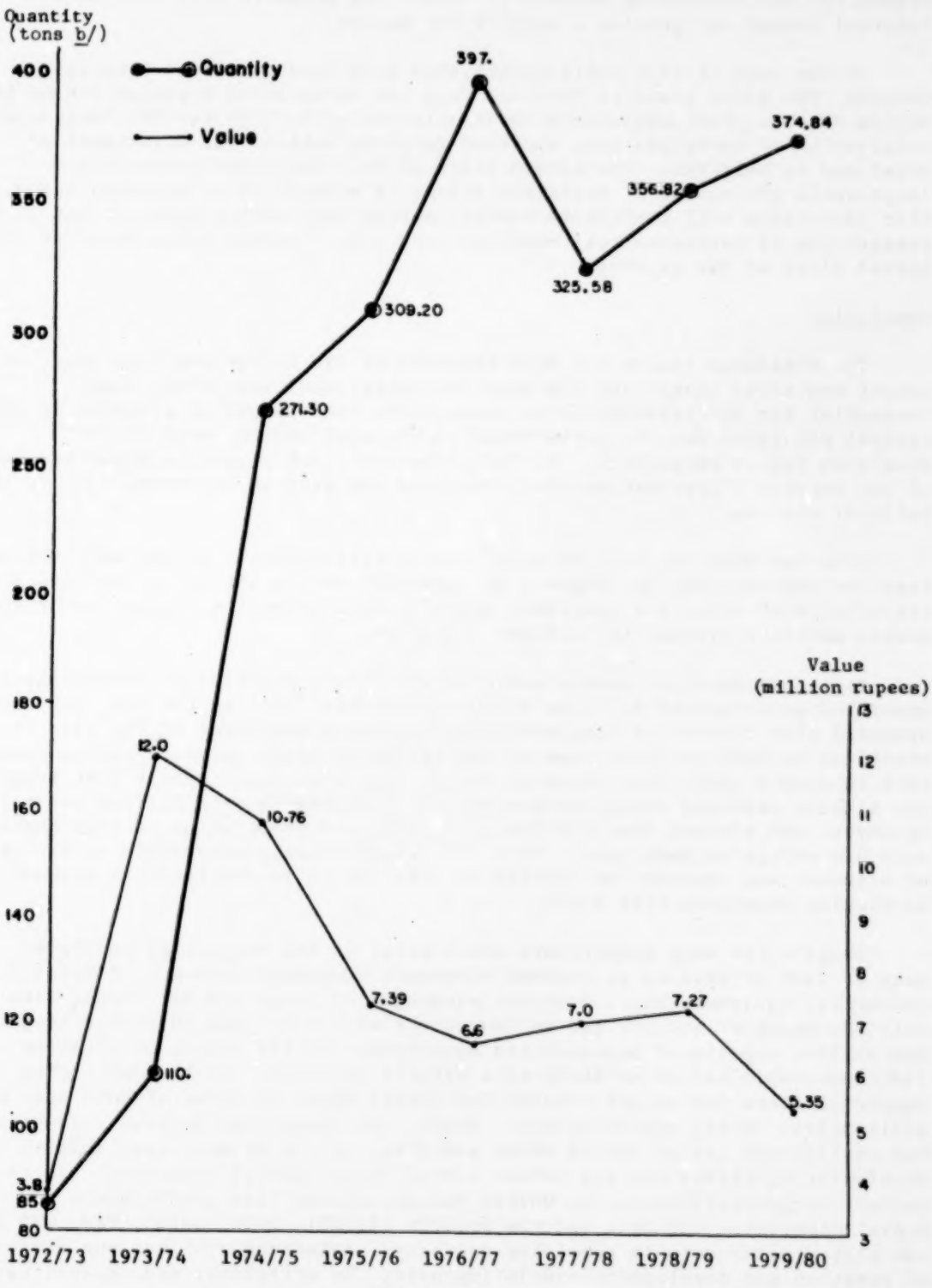
*At the time of this Workshop, the value of the Nepalese rupee in relation to the United States dollar was $US 1 = NRs 13.20.

**Ton = 2,240 lbs = 1.016 tonnes.

Quantity and value of herbs and herbal drugs exported by Nepal, a/ 1972/73-1979/80



a/ Not included are the exports of these items to India for which accurate figures are not available.

b/ Ton = 2,240 lbs = 1.016 tonnes.

the Agriculture Development Bank and the Agricultural Inputs Corporation, on joint recommendations made by the Department of Medicinal Plants and the Herb Production and Processing Company Limited. The products will both meet internal demand and provide a surplus for export.

In the case of this newly-established Herb Production and Processing Company, the first phase of UNDP and Food and Agriculture Organization of the United Nations (FAO) assistance in association with UNIDO for the large-scale cultivation of herbs has been approved recently both by the Government of Nepal and by UNDP/FAO. The second phase of UNDP/UNIDO assistance for large-scale processing of medicinal plants is already in an advanced stage. This assistance will contribute towards making the country self-reliant in the preparation of pharmaceutical chemicals and other intermediates based on the herbal flora of the country.

Conclusion

The Himalayan region has been regarded as the sacred dwelling place of potent medicinal plants and has supplied herbal medicines since time immemorial for the alleviation of human suffering. Nepal is situated in the central Himalayas and the herbs found in the east and the west of the Himalayan region merge here. In fact, the medicinal plants in Nepal are one of the country's greatest natural resources and play an important role in the national economy.

Asia has been the seat of many human civilizations. It has many ancient legacies and national heritages. An important one is the art of healing and the science of life, the Ayurveda, which is said to be the foundation of the modern medicine system, the allopathic system.

The advancement of modern medicine with its sophisticated technology and amenities nevertheless has some serious drawbacks, such as the toxicity and unwanted side-effects of some medicines. Growing awareness of the adverse reactions brought about by some of the synthetic drugs has made people come back to find a substitute based on herbs. It is in this context that Nepal has already launched important projects to cultivate and to collect her herbal resources and process them for the production and preparation of high-quality, safe and effective medicines. This will significantly contribute to the cure of diseases and improve the quality of life, which is particularly needed in developing countries like Nepal.

Despite the many constraints which exist in the developing countries, such as lack of skilled or trained manpower, technical know-how, financial resources, equipment etc., frequent exchanges of ideas and experience like this one among scientists and technologists will help lead to self-reliance in the various aspects of research and development on the proper utilization and judicious exploitation of herbs as a natural resource. In the developing countries there are no substitutes for herbal drugs in terms of both cost and availability of the raw materials. Hence, the technology evolved elsewhere in the revival and use of herbal-based medicines should be made available to the developing countries for the better use of their natural resources. In this respect, organizations in the United Nations system like the Economic and Social Commission for Asia and the Pacific (ESCAP), UNDP, UNIDO, FAO, WHO etc. can play a vital role in providing necessary assistance with various aspects of research and development and in improving the efficiency and capability of the local scientists and technologists in utilizing traditional medicines and allied products. This will contribute significantly to achieving the target set by WHO, "Health for all by the year 2000".

UTILIZATION OF MEDICINAL HERBS IN ROMANIA

By Gabriella Pintelie*

In our country, as throughout the world, medicinal herbs have constituted a source of relief and cure for suffering. The knowledge of the use of these remedies of vegetal nature has been handed down orally, thus becoming a traditional medicine known only to a group of people.

The first written data on the use of medicinal herbs in our country are given in Dioscorides De Universa Medica and in the works of Herodotus. Later on, the use of medicinal herbs, which constituted the main means of treatment until the beginning of the twentieth century, is mentioned in other works. Since the development of the chemical industry and the ability of the pharmaceutical industry to synthesize drugs, traditional medicine has enjoyed less attention. In our country, this was also due to the fact that, being a developing country in which the pharmaceutical industry was weakly represented, the efforts of scientists had to be directed to modern medicine.

Under these circumstances, the main concerns of the specialists in the phytochemistry field were to elaborate technologies for processing the main natural substances that were imported but for which there was also an indigenous basis of raw material. In this way, in the last 20-30 years, about 65 technologies for the preparation of natural substances have been developed for industrial use. Some of them are mentioned in table 1 below.

Table 1. Development of process technology for the utilization of medicinal plants

Name of the product	Name of the raw material	Developer of the technology and date of work
Atropine	Atropa belladonna	C. N. Ionescu (1949, 1950) E. Creangă (1956)
Morphine	Papaver somniferum	C. N. Ionescu (1953) E. Creangă (1958)
Dionine	Morphine	V. Niculesu (1955) M. Popescu (1956)
Sparteine	Sarothamnus scoparius	E. Cionga (1957,1958)
Rutin	Fagopyrum sp. Sophora japonica	E. Creangă (1968) D. Constantinescu (1960)
Total alkaloids	Claviceps purpurea	E. Cionga (1958)

continued

*Institute of Chemical and Pharmaceutical Research, Bucharest, Romania.

Table 1 (continued)

Name of the product	Name of the raw material	Developer of the technology and date of work
N-Butyl-scopolamine bromide	Scopolamine	R. Weitman (1958) A. Chiriţă (1972) V. Cînciu (1978)
Heleniene	Tagetes patula	V. Cucu (1958)
Total glycosides	Digitalis lanata	E. Creangă (1959)
Total mucilages	Carragheen	T. Goina (1960)
Codeine	Morphine	C. Guran (1962)
Solasodine	Solanum laciniatum	E. Ciouga (1965, 1974) I. Niţelea (1967) E. Creangă (1967) E. Nichiforescu (1968)
Scopolamine	Datura innoxia	V. Cucu (1966) C. Rizescu (1971)
Total alkaloids	Vinca minor	S. Mihai (1967) I. Ciulei (1968) I. Sas (1973)
Lanatoside C	Digitalis lanata	E. Creangă (1969) S. Milică (1971, 1973)
Desacetyllanatoside C	Lanatoside C	M. Vintilescu (1970)
Lysergic acid	Claviceps purpurea	I. Velca (1970) E. Nichiforescu (1973)
Lanatoside A	Digitalis lanata	S. Milică (1971, 1973)
Acetyldigitoxin	Lanatoside A	S. Milică (1971, 1972)
Digitoxin	Lanatoside A	S. Milică (1972)
Digoxin	Digitalis lanata	S. Milică (1972)
Colchicine	Colchicum autumnale	V. Calcandi (1972)
Ergotamine tartrate	Claviceps purpurea	M. Manuchian (1972)
Ergometrine maleate	Lysergic acid	I. Sas (1973)
Methylergometrine maleate	Lysergic acid	I. Sas (1974)
Vincamine	Vinca minor	I. Sas (1974, 1976)

continued

Table 1 (continued)

Name of the product	Name of the raw material	Developer of the technology and date of work
Dihydroergotamine methansulphonate	Ergotamine	H. Gavrilescu (1978)
Dihydroergotoxin methansulphonate	Ergotoxin	V. Mîscov (1978) G. Pintilie (1979)
Total alkaloids	Chelidonium majus	E. Grigorescu (1979)

The result of these researches has been to create a basis of intermediate materials making possible the industrial use of medicinal herbs. (It is worth mentioning that the industrial equipment used for processing these products has been designed by Romanian specialists.)

The main purpose of this research was to reduce dependence on imported pharmaceutical materials and technology but there has also been a concern to put to good use the medicinal herbs used in folk medicine. In studying the application of Romanian medical folklore, use has been made of both oral information and of treatises on ethnobotany written in the nineteenth and twentieth centuries by Romanian botanists and chemists (M. Pantu, M. Grintescu, Gh. Butura).

Researches were carried out which aimed at checking the therapeutic action, determining the chemical composition, establishing some physico-chemical methods of control and isolating the active principle. These researches have enabled many of the vegetal drugs to be standardized and introduced into current treatment practice in the form of teas made up of one or more plants. In this way, in our country, about 100 medicinal herbs are turned to good account. Likewise, active principles belonging to various classes of substances have been isolated, forming the subject of specialist papers published in various journals. Table 2 below summarizes this work.

Table 2. Active substances isolated from medicinal herbs

Name of the raw material	Name of the substance	Use in folk medicine	The author of the work and year of publication
Sorghum saccharatum	sanguisorguidine rubisorguidine	against rheumatism	G. Herman (1956)
Hippophae rhamnoides	isohamnetol		E. Grigorescu (1962)
Origanium vulgare	kaempferol	against headache, toothache	I. Matei (1972)

continued

Table 2 (continued)

Name of the raw material	Name of the substance	Use in folk medicine	The author of the work and year of publication
Levisticum officinale	xanthotoxin bergaptene psoralen	healing of wounds, stomach-ache	C. Csedo (1977)
Viburnum lantana	ursolic acid	against swelling	V. Cucu (1977)
Primula officinalis	primulic acid	against headache	L. Grecu (1975)
Hedera helix	hederasaponine C	against cough	C. Cioacă (1978)
Berberis vulgaris	berberine berbamine oxyacanthine	insecticide	M. Pitea (1970) " " " "
Chelidonium majus	berberine chelidonine coptizine chelerythrine sanguinarine	against pain in the legs	A. Gheorghiu (1971) A. Ionescu (1979) " " " "
Veratrum album	sinaine verine rubiverine	against hypertension	E. Cionga (1958) " " " "
Symphytum officinale	allantoin	healing of fractures	E. Constantinescu (1959)
Leucojum aestivum	licorice galantamine	against swollen spleen	A. Gheorghiu (1962) " "
Capsicum annuum	capsaicin dihydrocapsaicin norcapsaicin homodihydrocap-saicin	anti-malaria	C. Csedo (1962) " "
Aconitum napellus	aconitine hypoaconitine myoaconitine neoline	against rheumatism	O. Contz (1970) " " " " " "
Aristolochia clematitis	aristolochic acid	healing wounds	Y. Hociung (1972)
Talictrum minus	magnoflorine	against sleeplessness	I. Ciulei (1973)

continued

Table 2 (continued)

Name of the raw material	Name of the substance	Use in folk medicine	The author of the work and year of publication
Valeriana officinalis	actinidin	sedative	E. Cionga (1973)
Vinca minor	vincamine vincine 16-epivincamine	laxative	S. Mihai (1979) " " "

Most researches have centred on the isolation of alkaloids and less on other classes of substances such as flavonoids, saponins, triterpenoids. Some substances such as sinaine, verine, rubiverine are new substances.

Besides these unitary substances we should also mention the isolation of total active principles such as the total glycosides from Erysimum transilvanicum (Gh. Herman, 1958); the total fluoroglucine derivatives from Dryopteris filix mas (P. Ban, 1968); the total tannins from Senecio nemorensis (D. Albulescu, 1972); the total saponins from Primula officinalis (L. Grecu, 1973); Lamium album (V. Hodisan, 1977); Viola tricolor (M. Tâmas, 1978); the total alkaloids from Colchicum autumnale (A. Radu, 1978); the total furanocoumarins from Peucedanum officinale (M. Tâmas, 1978).

Nowadays, Romanian researches in the field of exploiting medicinal herbs are consonant with the general trend in the world towards developing and promoting drugs of vegetal origin. This research in Romania has the two aspects mentioned below:

(a) The agrobiological aspect which aims at introducing the cultivation of plants with an industrial importance, acclimatizing some plants, establishing culture technologies and improving the biological potentiality of the species;

(b) The phytochemical aspect, which aims at chemically characterizing the active principles and isolating them and especially the development of technologies for medicinal products.

Agrobiological research is carried out at the Research Centre for Medicinal and Aromatic Herbs, attached to the Academy of Agriculture and Forestry Sciences of the Ministry of Agriculture. This centre has teams of researchers in various parts of the country and co-operates with the various university departments of agronomy.

Phytochemical research is done at the Institute of Chemical-Pharmaceutical Research which is attached to the Central Institute of Chemical Research of the Ministry of Chemical Industry; at the Institute of Pharmaceutical Research and Control of Drugs of the Ministry of Health; at the university departments of pharmacy in Bucharest, Iassy, Cluj-Napoca, Tîrgu Mureș and at the faculties of chemistry. Phytochemical research related to the industrial processing of

plants as drugs is co-ordinated by a commission of the Ministry of Chemical Industry. In general, the Institute of Chemical-Pharmaceutical Research of the Ministry of Chemical Industry co-operates with the other institutes, checking up and adapting the methods for industrial processing.

As regards that kind of phytochemical research which deals especially with the plants used in folk medicine, in our country there are no institutions specializing in the application of therapy based on folk medicine as there are in other countries in Asia and Africa. However, relying on the same basic sources, namely oral tradition and treatises on ethnobotany, research has been carried out which has led to the development of processes that have been or are on the way to being used industrially for obtaining pure substances, active principles and bioactive extracts, as shown below in table 3.

Further research being undertaken is shown in table 4.

Briefly presented here are the contributions of Romanian researchers to utilizing medicinal herbs found in Romanian medical folklore, and to the creation of an industrial base for producing drugs of vegetal origin in Romania.

Table 3. Products derived from plants used in folk medicine

Name of the product	Name of the raw material	Therapeutic use	Author
Petasine	Petasites hybridus	antispasmodic tablets	I. Ciulei
Glaucine-hydro-bromide	Glaucium flavum	cough tablets	L. Roşca G. Pintilie
Silimarine	Silybum marianum	liver tablets	O. Contz
Berberine	Berberis vulgaris	liver tablets	O. Contz
Total flavonoids	Carduus mutans	liver tablets	T. Goina
Total triter-penoids	Vaccinium myrtillus	solution, tablets, cream, for liver conditions	L. Sommer E. Tarpo N. Cucu
Polyphenols	Corylus avellana	cosmetics	C. Csedo
Bioactive extract	Cynara scolymus	solution for liver function	E. Nichiforescu
Bioactive extract	Salix alba Ononis spinosa Agropyron repens Ocimum basilicum Juniperus communis Equisetum arvense Betula verrucosa	diuretic solution or tablets	E. Nichiforescu I. Popescu
Bioactive extract	Lamium album Leonurus cardiaca Glechoma hederacea	sedative	G. Racz
Bioactive extract	Herniaria glabra	diuretic solution	V. Hodoşan
Bioactive extract	Calendula officinalis Achillea millefolium Hypericum perforatum	protective cream	G. Racz
Bioactive extract	Ribes nigrum	high-blood-pressure tablets	G. Racz

Table 4. Further research on medicinal plants

Objective of the research	The raw material	Researcher	(Institute)
Coronary dilatator drug	Crataegus monogyna	G. Pintilie	(ICCF a/)
Antihistamine drug	Zea mais	V. Stefan	(ICCF a/)
Antirheumatism drug	Betula verricosa		(ICCSMCF b/)
Antimicrobial drug	Lepidium draba	G. Pintilie	(ICCF a/)
Cardiac tonic	Adonis vernalis		(ICCF a/)

a/ ICCF = Institute of Chemical-Pharmaceutical Research.

b/ ICSMCF = Institute of Pharmaceutical Research and Control of Drugs.

THE DEVELOPMENT OF AYURVEDIC MEDICINE IN SRI LANKA

By S. S. Ranawera*

As in China and other countries of the area, native medicine has been practised from very ancient times in Sri Lanka. The traditional method of medicine practised in Sri Lanka is derived from both the Desiya Chikithsa, which is indigenous to Sri Lanka, and the Ayurveda. Desiya Chikithsa is the system of medicine which has been practised in Sri Lanka from prehistoric times before the introduction of the Ayurvedic system from the Indian sub-continent. Thus, Desiya Chikithsa is strictly an indigenous Sri Lankan system dating from pre-Vijayan times. It specializes in treatment for specific ailments such as: snake bite, rabid dog bite, fractured and dislocated bones, eye diseases, psychiatric illnesses (umathuroga), carbuncles, boils, and tumours, Vidum pilissum (acupuncture and moxi biotion).

The present system of Ayurveda introduced from India and practised in Sri Lanka has been divided into eight branches:

Kayachikithsa (internal medicine)
Balachikithsa (paediatrics)
Grahachikithsa (bhuta vidya or psychological medicine)
Salakayatantra (oto-rhino-laryngology and opthalmology)
Salyatanta (surgery)
Agadatantra (toxicology)
Rasayanatantra (geriatrics)
Vajikaranatantra (sexology)

This system is known as Ashtanga Ayurveda. These systems of Ayurveda and Desiya have been practised in Sri Lanka along with the Siddha and Unani systems of medicine which were introduced from North India several centuries ago and were spread all over Sri Lanka by renowned physicians.

During the period of foreign rule, the indigenous systems of medicine were neglected, allopathic medicine was encouraged and the Ayurveda dropped into decline. Later, there was a movement for the revival of the Ayurvedic system. In 1925, the Legislative Council of Sri Lanka allocated a grant for training Ayurvedic physicians, a Board of Indigenous Medicine was established, and a college, hospital and out-patient dispensary were set up for this purpose.

With the outbreak of malaria in Sri Lanka in 1935, a need was felt in the country for Ayurvedic medicine to counteract the deadly disease by which thousands and thousands of lives were destroyed. Since there were not enough allopathic drugs to cope with the need, the Government was forced to open up temporary dispensaries all over the island. During this national disaster, Ayurvedic treatment was very successful in keeping pace with the allopathic medicine. It also established that 80 per cent of the population in Sri Lanka depended on Ayurvedic medicine rather than on allopathic drugs.

The first hospital to be opened in Colombo practising the indigenous system of medicine was able to accommodate only a few patients and about 300 out-patients. It was felt that one Ayurvedic hospital in the island could not

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*Ayurvedic Chief Physician, Government Ayurvedic Hospital, Kurunegala, Sri Lanka.

meet the demand of the growing population. To remedy this, and to strengthen the facilities for teaching the Ayurveda, Siddha, and Unani systems of medicine, new buildings for the hospital and for the out-patients' department were erected. In 1942, the Ayurvedic Act was enacted and ample opportunity was given for the revival of Ayurveda by the establishment of the Government Department of Ayurveda. After 1942, the original accommodation of the hospital was increased to take care of 250 in-patients and 1,000 out-patients. This was the only Ayurvedic hospital that existed at that time. In 1959, the Sri Lankan Government appealed to the World Health Organization for a specialist from India to visit Sri Lanka and make recommendations to the Government on the development of facilities for Ayurvedic medicine. The World Health Organization was kind enough to allocate Pandit Shiva Sharma from India to undertake this task. He made a survey of the system of Ayurveda as practised in Sri Lanka. The main recommendations in his report were to establish an institute to undertake research on the development of Ayurveda, Siddha and Unani medicines; to establish a drug factory to supply Ayurveda, Siddha and Unani drugs to the Government Ayurvedic Hospital; and to set up about 200 Ayurvedic dispensaries to meet the demand for drugs from practising Ayurvedic physicians.

This report was implemented by the Government in the following ways:

(a) The establishment of the Bandaranaike Ayurvedic Research Institute;

(b) The expansion of the Central Hospital of Ayurveda in Colombo and the setting-up of several hospitals and dispensaries in different parts of the island;

(c) Increasing the number of dispensaries run by the local authorities and paying increased financial grants;

(d) The establishment of the Ayurvedic Drug Corporation;

(e) Upgrading the Ayurvedic College to an affiliated body of the University of Colombo;

(f) The establishment of boards for compiling an Ayurvedic pharmacopoeia and indigenous prescriptions;

(g) Publication of books on Ayurveda;

(h) Setting up a scheme for training traditional Ayurveda physicians;

(i) The establishment of the Ministry of Indigenous Medicine as a separate ministry.

It was decided to encourage research work in this field, especially on the special drugs to deal with snake bites, asthma, skin diseases, arthritis etc. A Research Committee was appointed to co-ordinate research in all the branches of Ayurveda and on ancient medicines. Its responsibilities included the following:

(a) The study of Ayurvedic literature, the publication of manuscripts and text books, and the setting-up and maintenance of Ayurvedic libraries;

(b) Establishing the fundamentals of Ayurvedic doctrines and the principles of clinical treatment;

(c) Developing Ayurvedic pharmacology, publishing an Ayurvedic pharmacopoeia, and the standardization of Ayurvedic drugs.

All these tasks have been carried out and there is now an Ayurvedic drug factory, run by the Sri Lanka Drug Corporation, to manufacture medicines in large enough quantities to meet the needs of the country. This drug factory is the only one in Sri Lanka producing medicines with modern power-driven pharmaceutical machinery. Apart from these activities, the Government has taken steps to establish the Siddha Medical College and has given grants for several other medical colleges run by the All-Ceylon Traditional Ayurvedic Medicine Organization in various parts of the island.

Seminars have been arranged for traditional physicians to improve their professional knowledge. A scholarship scheme was organized to train a number of students abroad. In pursuit of the Ayurvedic Act No. 31 of 1961, arrangements were made by the Ayurvedic Medical Council to register all the traditional physicians in Sri Lanka, and also to upgrade the qualifications of suitable personnel by enabling them to gain admission to the Institute of Ayurveda at the University of Ceylon so that they could qualify for the Diploma in Ayurveda.

The Government also arranged for the establishment of herbaria in various parts of the island to encourage domestic growing of herbs so that these would not need to be imported. The extent to which indigenous systems like Ayurveda rely on herbal medicines is well known. Use of herbal medicine is desirable because it encourages self-reliance in using traditional technology and drawing on the available natural resources. It is economically more advantageous because herbal medicines are less expensive than synthetic drugs. It is now generally accepted that herbal medicines, properly prepared and used, are free from side effects, which, unfortunately, is not the case with some of the synthetic drugs. This last fact has drawn the attention of scientists and health administrators to the desirability of using herbal medicines. The interest the World Health Organization is taking in the development of traditional systems of medicine may be partly ascribed to this reason. In Sri Lanka, traditional medicine is slowly but surely being given its rightful place. It is hoped that in the future it will be able to supplement the national health-care programmes to an even greater extent.

DEVELOPMENTS IN TRADITIONAL MEDICINE IN THE UNITED REPUBLIC OF TANZANIA

By E.N. Mshiu*

Historical background

Traditional healers in the United Republic of Tanzania have continued to exist on their own. They have mostly not been under Government control and their secrecy has tended to make the medical profession feel uneasy. In 1969, a circular was issued by the Chief Medical Officer of the Ministry of Health to all regional medical officers in the Tanzanian mainland, requesting them to collect information from the healers on traditional medical practices, including the drugs which were being used, so that the methods used could be subjected to clinical trials and the medicaments to chemical analysis in order to identify the active ingredients. Unfortunately, the busy regional medical doctors had little leisure for research and the subject was therefore turned over to the Faculty of Medicine in the University of Dar es Salaam.

The Board of the Faculty of Medicine considered the request from the Ministry of Health on research into traditional medicine and, after several meetings of its Ad hoc Committee, a recommendation was forwarded to the senate of the University of Dar es Salaam to establish a research unit and a special committee for research into traditional medicine. The senate approved the recommendations of the Faculty of Medicine in 1973 and, in the same year, the council of the University endorsed and approved the establishment of the unit and the special committee. The Research Unit came into operation in July 1974.

The broad objectives of the Research Unit

These are:

(a) To collect comprehensive information about traditional medical practices, including the methods of treatment and the drugs employed;

(b) To identify the sources of drugs and subject them to chemical analysis or other tests for the purpose of singling out the active ingredients, whose analysis might later suggest ways in which the isolated materials could be used for the preparation of clinically-useful drugs;

(c) To study the traditional practitioner's practices and customs and the role they play in Tanzanian society and to work out ways of integrating the useful practices and customs with modern medicine.

Steps in the implementation of the objectives

These include:

(a) The collection of information and materials of plant, animal and mineral origin from traditional healers;

(b) Carrying out botanical identification of the plants and other materials received;

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*Director, Traditional Medicine Research Unit, Muhimbili Medical Centre, University of Dar es Salaam, United Republic of Tanzania.

(c) Conducting phytochemical screening;

(d) Carrying out phytopharmacological and microbiological screening;

(e) Conducting clinical trials of successful extracts and compounds;

(f) Studying the methods of treatment employed by the traditional healers and in suitable cases subjecting them to clinical investigations;

(g) Establishing experimental farms for medicinal plants which are proved to be useful.

Organization of the Traditional Medicine Research Unit

Since its formation in 1974, the Traditional Medicine Research Unit has been expected to collaborate with the relevant departments of the University, other research organizations and relevant ministries. In this way, the Unit collaborates with the Division of Pharmaceutical Sciences, the clinical division of the Faculty of Medicine, the Departments of Chemistry and Botany of the University of Dar es Salaam, the Departments of Pharmacology and Microbiology/Immunology, the Faculty of Agriculture, Forestry and Veterinary Sciences and the Department of Sociology, University of Dar es Salaam. The Unit collaborates further with the Tanzania National Scientific Research Council, the National Medical Research Institute and the tropical-pesticides research organization, Arusha. The following ministries are involved in the collaboration: the Ministries of Health, Agriculture, Information and Culture, Forestry and Tourism.

The Traditional Medicine Research Unit is divided internally into several sections:

Phytochemical screening section
Pharmacognostic and herbarium section
Pharmacological and microbiological section
Sociological section
Clinical section

It is to be noted that the Unit, because of its set up, can collaborate with any other department of the University of Dar es Salaam or with any other research organization, when the need arises.

Finance. The Unit is financed through yearly estimates by the Ministry of Health. Development capital for the Unit is provided by the Ministry of Education through the University of Dar es Salaam and the recurrent expenditure is administered by the Ministry of Health through the Muhimbili Medical Centre. The operational costs for the Unit have been increasing gradually. In the financial year 1981/82, the total expenditure was 616,000 Tanzanian shillings (TSh)* and in the financial year 1982/83, the expenditure is estimated to be TSh 855,805. It is estimated that in 1983/84, the total expenditure will be TSh 997,270.

Staffing. The present total staff of the Unit is 24, including 10 scientists in the fields of pharmacology, chemistry, pharmacy, medicine and

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*At the time of the Workshop, the value of the Tanzanian shilling (TSh) in relation to the United States dollar was $US 1 = TSh 9.57.

botany. The rest of the staff are chemistry and microbiology technicians, laboratory attendants, animal attendant and other operational staff.

Administrative structure. The Traditional Medicine Research Unit operates under two Ministries, the Ministry of National Education (through the University of Dar es Salaam) and the Ministry of Health (through the Muhimbili Medical Centre). The Director of the Unit is responsible to the Director-General of the Muhimbili Medical Centre through the Dean of the Faculty of Medicine. The professional staff are appointed by a joint committee, composed of members from the University of Dar es Salaam and the Muhimbili Medical Centre. The rest of the staff are appointed by a committee of members from the Muhimbili Medical Centre. All administrative and research matters in the Unit are handled by the Director of the Unit in consultation with the Dean of the Faculty of Medicine and the Director General of the Muhimbili Medical Centre. Guidance in research matters is given by the Unit's special committee for research into traditional medicine, the Faculty Board of Medicine and the senate of the University of Dar es Salaam.

Research achievements

Ethnobotanical research. Ethnobotanical studies have been the preoccupation of the Unit since its establishment in 1974. The studies involve interviewing traditional healers on their practising history, diseases treated, and plant, mineral or animal parts used in treatment. Special forms are used to classify the healers' experience, competence and co-operation, and the etiology, description and symptoms of the diseases. For the plants collected, information on the vernacular name, plant habitat, locality, medicinal uses, dosage and regimen and finally the botanical name, including the family it belong to, are recorded. From 1974 to 1981, over 800 traditional healers were interviewed and 2,700 speciments collected. Up to June 1982, 2,000 plant specimens had been identified botanically. The identified plants represent over 80 families, 170 genera and 250 species.

Phytochemical, microbiological and pharmacological screening. Although the Unit started in 1974, chemical investigation of medicinal plants did not start until 1979 because of the shortage of equipment, manpower and lack of laboratories. In 1981, a new building, consisting of three major laboratories, was officially opened by the President of the United Republic of Tanzania. As mentioned earlier, efforts have been made to equip the laboratories, and the key staff have already been employed. To date, the staff of the chemistry division of the Unit have already carried out a literature survey on 315 plant species, representing 77 families and 203 genera. Out of the 315 plant species, 124 plant species, representing 44 families, were noted to have little or no work reported up to June 1978. The Unit has already collected slightly over 50 plant samples out of which over 242 speciments have already been extracted for microbiological screening and for *in vitro* and *in vivo* studies. Qualitative analysis has been carried out on 76 plant samples representing 41 families and 60 genera. In 14 plants, alkaloids were present, indicating that they could be of therapeutic value, and pharmacological studies are being carried out. Essential-oil determination of eucalyptus leaves, cardamon seeds and chenopodium was carried out. It was satisfying to note that cardamon seeds had a higher oil content than that reported for a standard sample.

Microbiological screening has already been carried out on a total of 198 plant samples. These were preliminarily screened for antibacterial and antifungal properties. The findings were very encouraging and the promising plant extracts are now being investigated pharmacologically. Some of the

plants which showed good antifungal properties were Zanha africana (Sapindaceae), Plumbago zeylanica (Plumbaginaceae) and Dioscorea dumentorium. In addition to pharmacological studies on antifungal drugs, studies on traditional plants claimed to have estrogenic and androgenic activity were carried out. The investigations so far have shown some promising results. Chronic-toxicity studies were carried out on plants such as Cassia singuena (root extract), Launea cornuta (leaves), Helichrysum sotesum (leaves) and Tabernaemontana elegans. All the plant extracts, except that from Tabernaemontana elegans, which is used traditionally for family planning, were proved to be safe and could be used by the healers in the treatment of what they claim to be hernia, nausea, convulsion and epilepsy. A total of 55 plant extracts were screened in vitro for anticoagulating properties. Two extracts, Albizzia schimperana and Lannea stuhlmanii showed the highest activity and further studies are in progress. The Unit, in collaboration with the relevant departments of the University of Dar es Salaam are now screening plant extracts used traditionally to treat patients with sickle-cell anaemia. Studies are also in progress investigating plants with molluscicidal properties, insecticidal properties and antimalarial properties.

Future plans

It is intended to:

(a) Continue with the general survey of traditional medicine in the United Republic of Tanzania. So far only five regions of the mainland have been covered;

(b) Carry out extraction of proven medicinal plants with the aim of using such medicines in the hospital;

(c) Continue with phytochemical, microbiological and phytopharmacological screening of plant extracts which have shown some activity in our general screening;

(d) Carry out clinical evaluation of patients who are receiving traditional treatments;

(e) Carry out cultivation of proven medicinal plants on an experimental basis.

Conclusion

A large proportion of the people in the United Republic of Tanzania still depend on traditional methods of treatment, particularly in the rural areas. Because of this extensive use, it is the feeling of the Unit that a link between research and application should be maintained and emphasized. The continuing guide for research must be the communities themselves because their practices do indeed reflect local needs and because of the strong empirical basis of these practices.

In order to carry out these plans, assistance will be required in the areas of finance, transportation, research equipment and chemicals. It is hoped that international organizations will see the need to assist in all these areas of research. The Unit would be prepared to collaborate with any other reserach centre in the field of research into traditional medicine, particularly in the areas of staff training, exchange of information on medicinal plants and screening of medicinal plants, especially pharmacological

screening. By sharing knowledge and experience, a lot of duplication in research activities can be eliminated.

The attached annex shows plants which the Traditional Medicine Research Unit proposes should be cultivated in the United Republic of Tanzania for their medicinal uses.

Annex

PLANTS PROPOSED FOR CULTIVATION AND THEIR MEDICINAL USES

(The species are given by family. For each species, the form of the raw material used is given, followed by the medicinal properties.)

Agavaceae

1. Agave sisalana

Dried juice of leaves. Contains pentosides like aloin, beta-barbaloin, iso-barbaloin. It is an ingredient of compound benzoin tincture and is used as a cathartic.

Anacardiaceae

2. Pistacia lentiscus

Resinous exudation, (small, hard, yellowish tears with an aromatic odour and agreeable taste), becomes plastic when chewed, melting point 105° to 120°. Solutions of mastic in alcohol, ether, or chloroform are used, applied on cotton wool as temporary fillings for carious teeth. Compound mastic paint is used as a protective covering for wounds and to hold gauze and radium needles in position (Martindale, 1975).

3. Rhus vulgaria, R. glabra

Dried fruits. Rhus has astringent and reputed diuretic properties. It was formerly used in the form of a decoction (1 in 20) or liquid extract (1 in 1), mixed with glycerin and water, as a gargle, especially in conjunction with potassium chlorate (Martindale, 1975).

Angiaceae

4. Alangium salviifolium

Roots. Used for rheumatism.

A. chenese has been found to be toxic.

Apocynaceae

5. Catharanthus roseus syn. Vinca roseus

Alkaloids: vinblastine sulphate (BP, USP) and vincristine sulphate (USP). These are antineoplastic agents which may act by arresting mitosis at the metaphase. It is used intravenously, principally in the treatment of acute leukaemia in children, Hodgkin's disease, reticulum-cell sarcoma, lymphosarcoma, and myosarcoma (Martindale, 1975).

6. Strophanthus emini

Same as S. kombe

7. S. gratus

Glycoside from seeds, Ouabain (BP). A cardiac glycoside with action similar to that of digitalis. Its potency is twice that of straphanthin-K (Martindale, 1975).

8. S. kombe

Glycosides mixture, strophanthin-K. It has action on the heart similar to that of digitalis but is less cumulative (Martindale, 1975).

9. Thevetia neriifolia

Glycosides, thevetin and peruvoside. Peruvoside is used in congestive heart failure. Thevetin produces typical digitalis actions and is a substitute for digitalis (Martindale, 1975).

10. Voacanga lutescens

The roots and stem bark contain a great number of indole alkaloids, also the leaves and seeds. The chemical compounds have been screened pharmacologically and found to have some hypotensive and weak sympatholytic and parasympatholitic activities. It is at present being exported privately to the Federal Republic of Germany (as seeds).

Asclepiadaceae

11. Calotropis procera

Contains a cardiac glycoside, calotropin, a very potent glycoside which could be investiaged for use in heart diseases.

12. Gomphocarpus frutiasus

Contains a cardiac glycoside, and is known to be poisonous to animals and man.

Caesalpiniaceae

13. Cassia abbreviata

Same as C. senna

14. C. absus

Same as C. senna

15. C. afrofistula

Same as C. senna

16. C. alata

Same as C. senna

17. C. fistula

Ripe fruits. Aqueous percolate of crushed ripe cassia fruits is evaporated to the consistency of a soft extract. Cassia pulp is purgative owing tc its content of hydroxymethyl-anthraquinones. It is an ingredient of senna confection (Martindale, 1975).

18. C. floribunda

Same as C. senna

19. C. italica

Same as C. senna

20. C. obtusifolia

Same as C. senna

21. C. occidentalis

Same as C. senna

22. C. senna

Fruit and leaves. Contains sennoside A and sennoside B, glycosides of rheindianthrone. Purgative. Compound senna mixture, concentrated senna infusion, fresh senna infusion, senna elixir, senna liquid extract, senna tincture, senna confection, senna fluid extract, senna syrup.

23. Centella asiatica

Fresh and dried leaves and stems. It is used for skin diseases and as a diuretic, for leprosy and syphilis. Large doses have a narcotic action. A glycoside, asiaticoside has been used in the treatment of leprous ulcers (Martindale, 1975).

24. Tamarindus indica

Fruits and polysaccharide extract from seeds, tamarind and tamarind polyose. The fruits are freed from the brittle outer part of the pericarp and preserved with sugar. It contains tartaric acids, potassium hydrogen tartrate, 25 to 40 per cent of invert sugar and a small amount of nicotinic acid. Tamarind is a mild purgative. It is an ingredient of senna confection. Tamarind polyose has been used as a binding agent in tablets, as a suspension agent for insoluble powders, and as an emulsifying agent.

Caricaceae

25. Carica papaya

Unripe fruit. A proteolytic enzyme or mixture of enzymes prepared from the juice of pawpaw (unripe fruit) is used to assist the digestion of protein in patients with chronic dyspepsia and gastritis. It is widely used as a meat tenderiser and in the clarification of beverages.

Caryophyllaceae

26. Saponaria officinale

Dried roots, saponins. It has been used as an expectorant and diuretic, usually as a decoction or infusion (Martindale, 1975).

Celastraceae

27. Maytenus buchananii

Whole plant. It is used for cancer.

Chenopodiaceae

28. Chenopodium ambrosiodes

Oil from the fresh flowering and fruiting plants (aerial plant). It contains ascaridole. It is used as an anthelmintic in the treatment of hookworm and roundworm infections (Martindale, 1975).

Compositae

29. Cynara scolymus

Leaves have diuretic and choleretic properties (Martindale, 1975).

Dioscoreaceae

30. Dioscorea astericus

Tubers. Active principle is diosgenin along with yamogenin. Diosgenin is used as a raw material for the synthesis of corticosteroids, oral contraceptives etc.

31. D. dumetorum

Same as D. astericus

32. D. quartiniana

Same as D. astericus

Erythroxylaceae

33. Erythroxylon coca

Leaves. Total alkaloid content varies from 0.5 to 1.5 per cent. Coca is frequently valued for its ecgonine content and is used in the form of an elixir or liquid extract, as a cerebral and muscle stimulant during convalescence, and for the relief of gastric pain, nausea and vomiting.

Euphorbiaceae

34. Croton tiglium

Oil from seeds. A powerful purgative, rubefacient and vesicant.

35. Euphorbia hirta

Dried entire plant. It has been used in the form of a liquid extract or tincture in the treatment of coughs and asthma.

36. E. obvalifolia

Same as E. hirta

37. E. tirucalli

Same as E. hirta

38. E. usambarica

Same as E. hirta

39. Ricinus communis

Fixed oil expressed, without application heat, from seeds. Castor oil is a purgative. It takes effect in 4 to 8 hours. It is given in acute diarrhoea, particularly when due to food poisoning. Small repeated doses of 0.3 to 0.6 ml are given for intestinal colic in children. Seeds contain ricin, a highly toxic albuminoid protein which remains in the seed cake after expression of oil, ricin is destroyed by steam treatment and the resulting seed cake is used as a fertilizer.

Gramineae

40. Cymbopogon citratus

Oil obtained by distillation of plant. Lemon-grass oil is given as a carminative but is now employed mainly in perfumery and as a source of citral which is used for the manufacture of ionones and vitamin A.

41. Pelargonium alchemilloides

Contains geranium oil which could be used in the perfume industry and as a flavouring agent.

42. P. quinguelobatum

Same as P. alchemilloides

Hypericaceae

43. Hypericum peplidifolium

Flowering tops. Contains hypericin which causes photosensitization. It has astringent and diuretic properties and has been used as an infusion.

Labiatae

44. Iboza multiflora

Roots. Used for bilharzia and rheumatism.

45. Ocimum basilicum

Leaves and seeds. Leaves are used as a flavouring agent. Seeds are useful in catarrh, chronic diarrhoea, dysentery, gonorrhoea, nephritis, cystitis and internal piles.

46. Salvia officinale

Dried leaves (1 to 2.5 per cent volatile oil). It has carminative properties, sage oil has been reported to have spasmolytic properties and to diminish salivation.

Lauraceae

47. Cinnamomum camphora

Distillation of wood (camphor). Taken internally, camphor is irritant and carminative. It has been used as a mild expectorant and to relieve gripe. Externally, it acts as a rubefacient and mild analgesic.

Liliaceae

48. Aloe flexilifolia

Solid residue obtained by evaporating the liquid which drains from the cut leaves of various species of aloe. Aloe is an anthraquinone purgative producing a motion 6 to 12 hours after administration. As it is intensely bitter it has been given in pills or tablets. Because of a tendency to cause griping it has been used in conjunction with belladonna and carminatives.

49. A. graminicola

Same as A. flexilifolia

50. A. rabainensis

Same as A. flexilifolia

51. Asparagus africana

Used as flavour and stimulant.

52. A. rasemosus

Climber. Parts used are roots and leaves. Constituents are saccharine and mucilage. Used as tonic nutritive, demulcent, antispasmodic.

53. A. setacens

Same as A. rasemosus

54. Gloriosa superba

Contains colchicine and colchicine-like alkaloids. Its rhizome is highly toxic to livestock. Used for poisoning.

Lobeliaceae

55. Lobelia anceps

Dried aerial part. Action is due to lobeline. Tinctures, often in conjunction with iodides, have been used in the treatment of bronchial asthma and chronic bronchitis. It may aggravate chronic bronchitis.

56. L. holstiii

Same as L. anceps

Loganiaceae

57. Strychnos spinosa

Dried ripe seeds (> 1.2 per cent strychnine). Extremely bitter and potent action on the central nervous system. Used as tonic with iron. As an ingredient of purgative pills. It is analeptic but it stimulates respiration and the cardiovascular centre only if used in convulsive doses.

Loranthaceae

58. Lawsonia inermis

Dried leaves (Lawsone, 2-hydroxy-1,4 naphthaquinone). Henna leaves are used as a cooling and decorative cosmetic on the palms and soles. Leaf powder in a dosage of 3 grams daily is used for the treatment of intestinal amoebiasis.

Maranthaceae

59. Scilla indica

Sliced and dried scale leaves from the bulb of Scilla indica. Grows on sand soil. Contains as active principle scillaren A and B. Used to increase the vigour of the heart and diminish the cardiac action. It is a powerful expectorant and is used in chronic bronchitis and coughs.

Meliaceae

60. Azadirachta indica

Dried stem bark, root bark, leaves and seeds. It is used for loss of appetite and included in many tonic formulations. An oil expressed from the seeds has been used as a hair tonic and in skin diseases.

Menispermaceae

61. Jatrorrhiza palmata

Dried transverse or oblique slices of the root. Calumba, a bitter which has been used in atonic dysepsia associated with hypochlorhydria. It contains no tannins and can be given with iron salts.

Mimosaceae

62. Acacia catechu

Dried aqueous extract of heartwood. Black catechu is an astringent and is employed usually with chalk in mixture form in the treatment of diarrhoea.

63. A. senegal

Dried gummy exudation from stem and branches. Acacia is used with tragacanth as a suspending agent for resinous tinctures and non-dispersible powders in mixtures. It is used for emulsifying and as a demulcent in lozenges and pastilles where it provides slow disintegration.

64. Areca catechu

Dried ripe seeds (> 0.25 per cent alkaloids as arecoline). It is used as an anthelmintic in veterinary medicine. It was formerly employed as a decoction (1 in 10) or enema (2 in 20) for tapeworm infection.

Myrtaceae

65. Eucalyptus biostuta

Dried juice from leaves and eucalyptus oil. Principal constituent is kinotannic acid. Kino has an astringent action. A liquid extract and a tincture (dose: 1-4 ml) have been used in the treatment of diarrhoea, diluted with 15 parts of water, as styptic and astringent gargle. Oil is used for catarrhal conditions of respiratory tract.

66. E. globulus

Same as E. biostuta

67. Eugenia caryophyllus

Dried flower buds (clove). A carminative used in flatulence and dyspepsia. Clove infusions are sometimes used as basis for mixtures.

68. Melaleuca leucodendron

Oil obtained by distillation of fresh leaves and twigs. Cajuput oil is employed internally as a carminative and externally as a stimulant and mild rubefacient in rheumatism. It is an ingredient of some ointments and linaments.

Papilionaceae

69. Derris elliptica

Dried rhizomes and roots. Derris is a widely used agricultural and horticultural insecticide and larvicide. It is a contact and stomach poison, its action being due to the present of rotenone and other resins.

70. Myroxylon toluifera

Balsam exuded from the trunk. Peru balsam has a very mild antiseptic action by virtue of its content of cinnamic and benzoic acids. It has been used in the treatment of eczema and pruritus.

Passifloraceae

71. Passiflora edulis

Dried flowering and fruiting tops. Passion flower is reputed to have antispasmodic and sedative properties. It has been used as a nerve sedative and for its supposed anodyne properties in various neuralgias.

Phytolaccaceae

72. Phytolacca decandra

Dried root. It has emetic, purgative and mildly narcotic properties. The powdered drug is powerfully sternutatory. It has been used in chronic rheumatism.

Plantaginaceae

73. Plantago lanceolata

Dried ripe seeds. On account of its content of mucilage, it is used as a demulcent. It absorbs and retains water and is therefore used as a bulk laxative in the treatment of chronic constipation.

Polygalaceae

74. Polygala erioptera

Dried root stock and root. Senega contains two glycosidal saponins, senegin and polygalic acid, which are not absorbed but irritate the gastric mucosa and give rise to the reflex secretion of mucus in the bronchioles. It is employed, usually with other expectorants, in the treatment of chronic bronchitis.

75. P. paniculata

Same as P. erioptera

76. P. stenopelata

Same as P. erioptera

Punicaceae

77. Punica granatum

Root bark and stem bark. This mixture of the tannates of the alkaloids has a specific action on tapeworms but is ineffective against other intestinal parasites. Its highly toxic nature prohibits its use in all but healthy adults.

Rosaceae

78. Brayera anthelmintica

Dried panicles of the fertilized pistillate flowers. Kousso has been used as an anthelmintic, particularly for the expulsion of tapeworms, but there is little evidence that it dislodges the heads.

Rubiaceae

79. Cinchona calysaia

Dried bark. Cinchona is bitter and has astringent properties. It may sometimes cause vomiting and if taken over long periods may give rise to symptoms of cinchonism. To keep the alkaloids in solution, liquid preparations of cinchona are usually given in acid media but the decoction and the tinctures may be prescribed with ammonium bicarbonate and in these cases acacia mucilage should be added to suspend the alkaloids.

80. C. ledgeriane

Same as C. calysaia

81. C. officinalis

Same as C. calysaia

82. C. succirubra

Same as C. calysaia

83. Gardenia jovis. G. tonantia

Whole plant. It is used for cancer.

84. Pilocarpus pennatifolius

Dried leaflets. The actions of jaborandi are mainly those of its principal alkaloid, pilocarpine. It itself is seldom used in medicine. It is sometimes added to hair lotions for its supposed effect in stimulating hair growth.

Rutaceae

85. Citrus aurantium

Oil obtained by distillation of flowers. Neroli oil is used as a flavouring agent and in perfumery.

86. Fagara macrophylla

Contains 8-methoxydihydronitidine. Used in the treatment of cancer in pharmacological testing.

Santalaceae

87. Santalum album

Oil obtained by distillation of heartwood. Sandalwood oil was formerly employed, often in conjunction with cubeb, as a urinary antiseptic. Oil of sandalwood is also used in perfumery.

Simaroubaceae

88. Balanites aegyptiaca

Fruit. Diosgenin (> 2 per cent) is used as a raw material for the synthesis of corticosteroids, oral contraceptives etc.

Smilacaceae

89. Smilax goetzeana

Dried root. Sarsaparilla, usually in the form of a decoction or extract, is used as a vehicle and flavouring agent for medicaments.

90. S. kraussiana

Same as S. goetzeana

91. S. utilis

Same as S. goetzeana

Solanaceae

92. Capsicum frutescens

Dried ripe fruits. Has a carminative action and is of value in atonic dyspepsia. Externally, it is used as a rubefacient in lumbago, neuralgia and rheumatism.

93. Datura innoxia

Dried leaves and flowering tops. Stramonium and preparations of stramonium have peripheral parasympatholytic effects similar to those of atropine but are less likely to cause cerebral excitement. It has been given to relieve spasm of the bronchioles in asthma and for this purpose was given in tablets or in mixtures, often with ethereal lobelia tincture or potassium iodide.

94. D. metel

Same as D. innoxia. Datura metel is used for the same purposes as belladonna, hyoscyamus and stramonium.

95. D. stramonium

Same as D. innoxia

96. Solanum aculeastrum

Dried stem and branches. Was formerly a popular remedy for chronic rheumatism and obstinate skin eruptions and was administered as an infusion or a liquid extract. It is poisonous due to the presence of solanine.

97. S. incanum

Same as S. aculeastrum.

Sterculiaceae

98. Cola nitida

Dried cotyledons. Its therapeutic properties derive from its caffeine content. It has been used with phenaxone in the treatment of migraine. Dry, soft and liquid extracts, tinctures and wines are used.

Umbelliferae

99. Foeniculum officinale

Dried fruits. An aromatic carminative. It is given to infants in the form of fennel water for the treatment of flatulence.

100. Pimpinella anisum

Dried ripe fruit. Anise is carminative and mildly expectorant. It is used mainly as oil or preparations of the oil. It is also used as a flavouring agent.

101. P. keniensis

Same as P. anisum

Other useful plants

Nutmeg (myristica fragrans). Used as flavouring and carminative.

Cinnamon (Cinnamomum zeylanicum). Used as flavouring agent, mild astringent and the oil is a powerful germicide.

Ginger (Zingiber officinale). Used as a carminative and stimulant and as a condiment.

Pepper (Piper nigrum). Used as a condiment.

Palm kernel. Used similarly to nutmeg.

Allanblaukia nuts. Grown in Morogoro and Tanga.

Annattoseeds. Grown in Arusha and Tanga.

Red Canadian wonder beans. Grown in Arusha and Handeni.

Beech der meer. Grown in Mafia.

Macadamia nuts. Grown in Mbeya, Dodoma and Singida.

Peppermint (Mentha piperita). Used as a carminative and aromatic stimulant.

Grecian foxglove (Digitalis lanata). Leaves are source of lanatoside and digoxin. Used in heart diseases.

White mustard (Sinapis alba). Used in the form of a plaster as rubefacient and counter-irritant and as a condiment.

Marigold (Calendula officinalis). Tinture diluted with water is applied on bruises.

French marigold (Tagetes patula). Used for a variety of ailments and also in cosmetic industry.

Deadly nightshade (Atropa belladonna). Source of hyoscyamine. Used as sedative and check on secretions.

Lavender (Lavendula officinalis). Contains volatile oil.

Wild camomile (Matricaria chamomilla). Source of volatile oil.

Wild thyme (Thymus vulgaris). Source of volatile oil and thymol.

Common valerian (Valeriana officinalis). Source of volatile oil used as carminative and antispasmodic.

Coriander (Coriandrum sativum). Used as a flavouring agent and carminative.

Nightshade (Solanum laciniatum). Contains the alkaloids solasodine and diosgenin. Source of steroid precursors.

THE CONTRIBUTION OF MEDICINAL PLANTS TO MEDICINES IN TURKEY

By B. Çubukçu*

Today, the great change in the form of medicines and a significant increase in the number of synthetic drugs has led us to suppose that herbal drugs have been withdrawn from use. However, many investigations have been carried out recently in almost every country in order to determine the real place of herbal-based drugs in treatment. These investigations have shown that herbal drugs can have an important place in treatment as they have had a long period of trial over centuries, they have less side effects, are better known and more cheaply obtainable. All these are the advantages of herbal drugs. Investigations have also been carried out in order to determine where phytotherapy is in Turkey [1, 2, 3, 4, 5].

Turkey has a very rich and varied flora. The total number of plant species growing in Turkey today is estimated to be about 10,000 [6]. This richness in variety has also influenced the use of the plants as remedies for ailments. It is known that some plants were used in Anatolia in the days of the Hittites during the twentieth century B.C.

The contribution of medicinal plants to medicines has been evolving during centuries. Today, these plants are used in modern drugs, but they are also still being used among people in their simple forms such as infusions, decoctions, powders and oils.

Traditional Turkish medicines

Many successive civilizations followed the Hittites in Anatolia and their knowledge of folk medicine has reached us in both written and oral form.

Today, people, either collect the raw materials for their traditional medicines from nature, or they buy them from the herbalists, at the market, from peddlers or occasionally from the pharmacists.

The main supplier of drugs to the public today in Turkey is the herbalist. The presence of herbalists has been known in Anatolia since the twelfth and thirteenth centuries A.D. They were the only source supplying herbal remedies to customers in the past. The regulations drafted in the nineteenth century transferred this function to the pharmacies and the drugs which the herbalists could sell were restricted.

During the days of the Ottoman Empire, the shops of the herbalists were found mainly in the major cities like Bursa, Edirne and Istanbul. Today they are still present in the big cities like Bursa and Istanbul though they have diminished in number. In Istanbul today, the two main places where the herbalists are found are the Egyptian Bazaar and Çemberlitaş. Herbalists may also be found scattered in various districts.

Annex I gives 177 herbal products which are sold by the herbalists in Istanbul today. About 30 of these drugs, constituting 17 per cent of the whole, are of foreign origin. This shows that over 80 per cent of the herbal drugs on sale are produced in Anatolia.

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*Department of Pharmacognosy, Faculty of Pharmacy, University of Istanbul, Turkey.

The herbalists found in the Anatolian cities other than Istanbul and Bursa have lost a great deal of their original function. They are now mostly shops selling herbs and seeds. However, one can find local medicinal plants in these shops such as everlasting flowers, sage leaves, ironwort, fennel root, salep root etc.

As for the small cities and districts, herbal drugs are sold by grocers, seed merchants, and in all sorts of shops and open markets. The outdoor markets which are set up in every district once a week sell mostly spices such as mint, origanum, black pepper, paprika etc.

Local fresh medicinal plants are usually sold by peddlers both in Istanbul and in other cities. These peddlers can easily be found in the courtyards of the mosques and markets of the districts. The herbal products they sell vary according to the region and the season. Among these plants can be mentioned, everlasting flowers, sage leaves, balsam apple, cucumber etc.

The number of herbal drugs sold in the pharmacies is extremely small and mainly consists of camomile flowers, lime blossom and anise. In an inquiry carried out in the Istanbul pharmacies in April 1982, it was found that these were sold either singly or made up into compositions [7].

Modern herbal drugs produced in Turkey

A study was done in 1978 to find out how much herbal-based drugs were used in Turkey [2], and it was found that the number of herbal drugs used in medicines was 937. This number is low compared to Belgium, England, France, Germany, Federal Republic of, and Italy which were found to use 1,600, 5,000, 7,500, 12,000 and 7,500 respectively. In the same study, the number of plant species used in medicines was found to be 96.

In a more recent study, the plants used in modern herbal medicines were examined in two groups, taking the Drug Index (1978) as the basis [8]. The two groups were (a) the plants used to provide the active compounds in medicines and (b) plants used in medicines as they are or in the form of their galenical preparations.

Plants used in medicines as active compounds. Plants used in medicines as active compounds and their frequency of use in these medicines are shown in annex II. The herbal active compounds taking the first 10 places in the list according to the frequency of use of the plants from which they are derived are as follows:

Plant-derived compounds	Frequency of use in medicines in the Drug Index
Opium alkaloids	130
Ascorbic acid	61
Ephedrine	53
Solanaceous alkaloids	52
Xanthine alkaloids	36
Menthol	36
Ergot alkaloids	24
Camphor	18
Rauwolfia alkaloids	14
Chinchona alkaloids	9

Seven of the first ten compounds belong to the alkaloids groups.

Plants used in medicines as they are or in the form of their galenical preparations. Plants used in medicines in Turkey as they are or in the form of their galenical preparations and their frequency of use in these medicines are given in annex III.

There are 80 plants in this list and they are used in these medicines 232 times. Excluding the antibiotics, 70 per cent of the herbal-based medicines contain herbal active compounds and 30 per cent contain herbal drugs or their galenical preparations. The list below gives the first ten most frequently used plants in medicines as drugs or galenical preparations.

Plant	Frequency of use
Atropa	16
Mentha	15
Thymus (origanum)	13
Citrus	13
Pinus	13
Uragogo ipecacuanha	9
Cinnamomum cassia	8
Jambosa caryophyllus	8
Pimpinella anisum	8
Eucalyptus	7

Apart from Atropa and Uragogo, the plants of this list are those containing volatile oils.

In a previous research, it had been found that the frequency of use of plants in medicines in France, Germany and Italy in the form of their galenical preparations were 2,597, 2,213 and 1,128 respectively and that the value for Turkey was 232 which was a very low one [5].

Conclusion

It has been observed that the contribution of plants to modern drugs in Turkey is 10 times less than in France, Germany or Italy.

Anatolian people have been using herbal drugs for 4,000 years and they carry on using the traditional drugs as the modern herbal medicines are limited in number.

About 200 Anatolian plants which are used in modern herbal drugs in other countries are not used in Turkey [5].

All these results show that it is necessary to develop the field of modern herbal drugs in Turkey.

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Annex I

THE MAIN HERBAL DRUGS SOLD IN TURKEY

Herbal drugs	Turkish names
Aetheroleum menthae	Nane esansı
M. myristicae	Küçük hindistancevizi yağı
A. rosae	Gül yağı
A. salviae	Adaçayı esansı
A. thymi	Kekik yağı
Aloe	Sarısabır
Amylum	Nişasta
A. marantae	Ararot
Aqua rosae	Gülsuyu
Benzoe	Asilbent
Bulbus scillae	Adasoğanı
Camphora	Kafur
Carragheen	Deniz kadayıfı
Catechu	Kadıhindi
Colophonium	Reçine, Kolofan
Cortex cascarillae	Amber kabuğu
C. cinchonae	Kınakına kabuğu
C. cinnamomi	Tarçın kabuğu
C. pini	Çam soymuğu
C. quillaiae	Panama kabuğu
C. granati	Nar kabuğu
C. thymiamatis	Buhur
Crocus	Safran
Flores althaeae	Hatmi çiçeği
Fl. caryophylli	Karanfil
Fl. chamomillae romanae	Alman papatyası

Herbal drugs	Turkish names
Fl. chamomillae vulgaris	Papatya çiçeği
Fl. elaeagni	İğde çiçeği
Fl. granati	Nar çiçeği
Fl. hibisci	Bamya çiçeği
Fl. lavandulae	Lavanta çiçeği
Fl. rhoeados	Gelincik çiçeği
Fl. robinae	Akasya çiçeği
Fl. rosae	Gül kurusu
Fl. sambuci	Mürver çiçeği
Fl. tiliae	Ihlamur çiçeği
Fl. verbasci	Sığırkuyruğu çiçeği
Fl. violae odoratae	Menekşe çiçeği
Folia adianti	Karabaldır yaprağı
F. aurantii amari	Turunç yaprağı
F. caricae	İncir yaprağı
F. cynarae	Enginar yaprağı
F. eucalypti	Ökaliptüs yaprağı
F. juglandis	Ceviz yaprağı
F. lauri	Defne yaprağı
F. lawsoniae	Kına yaprağı
F. malvae	Ebegümeci yaprağı
F. melissae	Melisa yaprağı
F. menthae piperitae	Nane yaprağı
F. mori nigrae	Karadut yaprağı
F. myrti	Mersin yaprağı
F. rhois coriariae	Sumak yaprağı
F. rosmarini	Biberiye (Kuşdili) yaprağı
F. rubi fruticosi	Böğürtlen yaprağı
F. salviae	Adaçayı yaprağı
F. sennae	Sinameki yaprağı
F. stramonii	Boruçiçeği yaprağı
F. theae	Çay yaprağı

Herbal drugs	Turkish names
Fructus anisi vulgaris	Anason
Fr. apii	Kereviz tohumu
Fr. arbuti	Kocayemiş
Ar. arecae	Farfelek
Fr. capsici	Kırmızı biber
Fr. cardamoni	Kakule
Fr. cassiae fistulae	Hiyarşembe
Fr. conii	Baldıran
Fr. coriandri	Kişniş
Fr. corni	Kızılcık kurusu
Fr. cubebae	Kübabe
Fr. cumini	Kimyon
Fr. foeniculi	Rezene, Raziyane
Fr. gundeliae	Kenger tohumu
Fr. jujubae	Hünnap meyvası
Fr. juniperi	Ardıç tohumu
Fr. lauri	Defne tohumu
Fr. paluiri	Çeşmezan
Fr. petroselini	Maydanoz tohumu
Fr. piperis nigri	Karabiber
Fr. pimentae	Yenibahar
Fr. rosae caninae	Kuşburnu
Fr. silybi mariani	Devedikeni tohumu
Fr. terminaliae	Karahalile
Fr. terminaliae citrinae	Sarıhalile
Fr. vanillae	Vanilya
Gallae quercinae	Mazı
Gummi arabicum	Arap zamkı
G. olibanum	Akgünlük
G. tragacanthae	Kitre zamkı
Gummiresina ammoniacum	Çadır uşağı

Herbal drugs	Turkish names
Herba absinthii	Pelinotu
H. artemisiae	Ayvadana
H. equiseti	Kırkkilit otu
H. fumariae	Şahtere otu
H. hyperici	Kantaron
H. origani	Kekik otu
H. parietariae	Yapışkan otu
H. plantaginis majoris	Sinirli yaprak otu
H. rutae	Sedefotu
H. sideritis	Dağ nanesi
H. stachydis	Karabaş otu
Lignum santoli rubrum	Kırmızı sandal
L. quassiae	Acı ağaç
Manna	Kudret helvası
Macis	Besbase
Mastix	Sakız
Oleum amygdalae expressum	Badem yağı
O. cacao	Kakao yağı
O. coryli	Fındık yağı
O. juglandis	Ceviz yağı
O. lauri expressum	Defne yağı
O. momordicae	Kudret narı yağı
O. ricini	Hint yağı
Pericarpum aurantii amari	Turunç kabuğu
P. citri	Limon kabuğu
P. juglandis	Ceviz kabuğu
Pix juniperi	Ardıç katranı
Pix liquida	Çam katranı
Pulpa tamarindorum	Demirhindi pulpası

Herbal drugs	Turkish names
Radix alkannae	Havacıva kökü
R. althaeae	Hatmi kökü
R. asphodeli	Çiriş otu kökü
R. chicorii	Hindiba kökü
R. gentianae	Defneyezit kökü
R. liquiritiae	Meyan kökü
R. pyrethri	Udukahir Nezleotu kökü
R. rubiae	Boyacı kökü
R. saponariae	Çöğen kökü
R. sarsaparillae	Saparna kökü
R. scirpi	Saz kökü
R. valerianae	Kedi otu kökü
Resina pini	Çam sakızı
Rhizoma calami	Eğir kökü
Rh. curcumae	Zerdeçöp
Rh. galangae	Havlican
Rh. graminis	Ayrık otu kökü
Rh. iridis	Menekşe kökü
Rh. rhei	Ravend rizomu
Rh. zedoariae	Zulumba
Rh. zingiberis	Zencefil
Semen amomi	Itrifil
S. amygdalae amara	Acıbadem
S. brassica napus	Şalgam tohumu
S. basilici	Reyhan tohumu
S. cannabis	Kenevir tohumu
S. coffeae	Kahve çekirdeği
S. cucurbitae	Kabak çekirdeği
S. cydoniae	Ayva çekirdeği
S. dauci	Havuç tohumu
S. foenu graeci	Çemen tohumu
S. gossypii	Pamuk tohumu

Herbal drugs	Turkish names
S. helianthii	Ayçiçeği
S. hippocastani	At kestanesi
S. lini	Keten tohumu
S. lupini	Acı bakla, Yahudi baklası
S. mori nigrae	Karadut tohumu
S. myristicae	Küçük hindistan cevizi
S. nigellae	Çöre otu, Çörek otu tohumu
S. papaveris	Haşhaş tohumu
S. pegani	Üzerlik tohumu
S. pruni persicae	Şeftali çekirdeği
S. pruni mahaleb	Mahlep tohumu
S. psyllii	Karnıyarık tohumu
S. sabadillae	Bitotu tohumu
S. sesami	Susam
S. sinapis	Hardal tohumu
S. staphysagriae	Mezvek, Karaot, Karaca otu, Bitotu
S. strychni	Kargabüken
S. urticae	Isırgan tohumu
S. visci	Çekem tohumu
Stylus maydis	Mısır püskülü
Styrax liquidus	Günlük
Succus elaterii	Yabani hıyar
S. liquiritiae	Meyan balı
Terebinthina	Terementi, Çam sakızı
Tuber cyclameni	Topalak
T. salep	Salep yumrusu
Valonea	Palamut

Annex II

PLANTS AND PLANT-DERIVED SUBSTANCES USED IN MEDICINES AS ACTIVE COMPOUNDS

	Frequency of use a/
Acacia senegal	4
Ascorbic acid (Vitamin C)	61
Atropa (atropine, hyocyamine and derivatives)	30
Capsicum	1
Carica papaya	1
Caryophyllus	1
Cascara sagrada	1
Cassia	2
Catharanthus	2
Centenella asiatica	1
Chinchona	9
Cinnamomum camphora (camphor)	18
Claviceps	24
Coffea	67
Cynara	1
Datura	22
Digitalis	7
Ephedra (ephedrine)	53
Eucalyptus (eucalyptol)	7
Fraxinus (mannitol)	2
Leuconostoc (dextran)	1
Mentha	36
Papaver somniferum	130
Pausinystalia	1
Peumus	1
Pilocarpus (pilocarpine)	1
Podophyllum	1
Quercus (tannin)	5
Rauwolfia	14
Scilla maritima var.alba	1
Sophora (rutoside)	1
Strophanthus	2
Strychnos	2
Thea	12
Thymus	3
Uragoga	2
Vanilla	2
Veratrum	1

a/ In drugs listed in the Drug Index (1978) [8].

Annex III

PLANTS PRODUCING HERBAL DRUGS THAT ARE USED IN MEDICINES AS THEY ARE OR IN THE FORM OF THEIR GALENICAL PREPARATION

(a) Plants of foreign origin

	Frequency of use a/		Frequency of use a/
Acacia senegal	4	Jambosa caryophyllus	8
Aconitum napellus	1	Lobelia inflata	1
Aloe ferox	4	Melaleuca viridifolia	1
Carica papaya	1	Myristica fragrans	1
Cassia angustifolia	5	Myroxylon balsamum	3
Centella asiatica	1	Myroxylon pereirae	5
Chinchona	2	Peumus boldus	1
Cinnamomum camphora	8	Podophyllum peltatum	1
Cinnamomum cassia	8	Quillaia saponaria	1
Cocos nuciferae	2	Rauwolfia serpentina	1
Cola nitida	3	Rheum palmatum	3
Commiphora abyssinia	3	Rubus fruticosus	4
Curcuma aromatica	1	Strychnos nux-vomica	1
Erythroxylum coca	1	Styrax tonkinensis	4
Ferula galbaniflua	1	Theobroma cacao	1
Gelidium amansii	1	Uragoga ipecacuanhae	9
Geranium robertianum	1	Vanilla planifolia	1
Hydrastis canadensis	1	Zingiber officinalis	1

a/ In drugs listed in the Drug Index (1978) [8].

Annex III (continued)

(b) Plants native to Turkey

	Frequency of use a/		Frequency of use a/
Acorus calamus	1	Matricaria chamomilla	3
Adiantum capillus veneris	3	Melissa officinalis	2
Aesculus hippocastanum (c) b/	1	Mentha piperita (c)	16
Atropa belladonna	16	Olea europea (c)	1
Capsicum annuum (c)	10	Origanum	1
Citrus aurantium (c)	12	Papaver rhoeas	2
Citrus bergamiae (c)	1	Papaver somniferum (c)	5
Crataegus oxyacantha	1	Passiflora incarnata (c)	2
Crocus sativus (c)	2	Pimpinella anisum (c)	8
Cynara scolymus (c)	1	Pinus	13
Drosera	1	Prunus amygdalus (c)	1
Eucalyptus	7	Prunus laurocerasus	1
Faex medicinalis	2	Quercus infectoria	1
Foeniculum vulgare	2	Rhamnus frangula	4
Hyoscyamus	3	Ricinus communis (c)	4
Hypericum perforatum	1	Rosa (c)	4
Juniperus communis	4	Rosmarinus officinalis (c)	2
Lactuca	1	Salix alba	1
Laurus nobilis	1	Thymus vulgaris	15
Lavandula spica	6	Valeriana officinalis	1
Linum usitatissimum (c)	1	Viola odorata	1
Liquidamber orientalis	1		

b/ (c) = cultivated.

PROMOTION AND DEVELOPMENT OF TRADITIONAL MEDICINE IN ZAMBIA

By Kapelwa Sikota*

Introduction

From the time diseases started to afflict human beings, men and women have sought ways and means of fighting against disease and protecting themselves against attacks of illness. People who have acquired a knowledge of the management of diseases are known as healers, and because they carry out their therapies in a traditional way, they are called traditional healers.

Traditional medicine and traditional healers, as well as traditional birth attendants (TBAs), have been defined so often that there is no need to do so at this stage.

The fight against disease started many centuries ago and the approach to the problem was mainly influenced by the culture, tradition, belief and social conditions prevailing in the communities within which traditional health workers practised. But in spite of differences between their backgrounds, traditional healers have one thing in common in that they use plants, minerals and animal substances as the basis for their treatment of disease.

As nations of the world began to develop in social, economic and scientific spheres, research in the medical field also developed. After many years of scientific studies, medical care envolved into what we now call the "modern" or "Western" medical-care system.

However, developing nations, including Zambia, continued to use herbal medicines in their natural form. The knowledge of medicine which had been passed on from generation to generation, often through apprenticeship, was treated by traditional medical practitioners as a personal treasure which could only be handed over to one's most beloved and trusted descendant who was thought worthy of inheriting the estate. This meant that, in some cases, a healer died possessing valuable knowledge of medicinal plants and their uses which he was not able to hand on to anybody else. As a result, a huge treasure of knowledge in traditional health-care practices has been lost to posterity.

The development and promotion of traditional medicine in Zambia

In Zambia, 75 per cent of the population live in rural areas, where communication is difficult and the established health services are inadequate. As a result, people consult the local traditional health workers when they are in distress. The traditional healers' ability to deal with the patient's psychological needs, which may be connected with social or economic problems, has gained them such respect and trust that many people, even in urban areas, use both modern and traditional health services freely.

Having recognized and accepted these facts, Zambia organized the first National Workshop for Traditional Healers in 1977. Many recommendations were made by the participants, a majority of whom were traditional healers. When Zambia announced her commitment to the promotion of primary health care for

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*Officer in charge of traditional medicine, Ministry of Health, Lusaka, Zambia.

the entire nation by the year 2000, it became clear that all available resources, including traditional health care, would have to be utilized if the programme were to succeed. The Government has therefore accorded some recognition to traditional healers. This recognition has been strengthened by the establishment of a unit within the Ministry of Health whose duty is to:

(a) Promote and develop traditional and herbal medicine;

(b) Initiate collaboration between modern and traditional health workers;

(c) Organize training programmes;

(d) Develop research programmes;

(e) Prepare legislation for the control of traditional medical practices.

Co-operation between modern health services and traditional healers

Co-operation between modern health services and traditional health services is being generated through workshops, seminars and training programmes at the local level.

Recent sample studies carried out by the Community Health Unit of the Institute for African Studies on the impact of primary health care in remote rural areas indicated that there is some kind of integration between the different health-care systems.

In Chainama Hills Mental Hospital, health workers are encouraged to get to know and work with traditional healers. Nurses who take patients' histories make careful enquiry into beliefs and causation of the illness, including any treatment by healers.

If a patient wants to consult a healer while still under the care of a psychiatrist, arrangements can be made provided the patient has no organic lesion contributory to the mental illness. Such patients are always welcomed back whenever they wish to return to the hospital. Studies have been initiated to determine what the healers do for their patients.

A four-day seminar was organized for traditional healers by health workers at Mwachisompola Health Demonstration Zone in July 1982. Its main objectives were:

(a) To establish a cordial relationship between traditional healers and the health workers at the centre;

(b) To exchange ideas between the two groups;

(c) To identify vital areas of co-operation between traditional healers and health workers at the centre in the delivery of primary health care;

(d) To generate a referral system both ways.

Training programmes

Traditional birth attendants (TBAs) play a vital role in midwifery, especially in rural areas. Their training was started as early as 1973, but the Ministry of Health drew up guidelines for the training of traditional birth attendants after the 1977 National Workshop for Traditional Healers.

The programme is financed by the United Nations Children's Fund (UNICEF), including the supply of midwifery kits. An evaluation programme was carried out recently to determine the success of the programme and the report is being prepared.

Regulation of traditional medical practices

A draft bill for the development and control of traditional medical practices is being prepared. The bill will provide for the establishment of a Council for Traditional Healing, whose functions will be to:

(a) Establish a register for the registration of traditional healers and traditional birth attendants;

(b) Develop training programmes;

(c) Protect both the healers and the patients from abuse;

(d) Introduce regulations relating to:

(i) Manufacture of drugs from local medicinal plants;

(ii) Importation and exportation of traditional medicinal plants;

(iii) Collection, preservation and storage of medicines.

Research

As part of Zambia's development programme, research centres have been established and studies are being carried out in various fields. Institutions like the University of Zambia, the National Council for Scientific Research and the Institute for African Studies are all interested in research into traditional medicine and medicinal plants. Even some Catholic priests, who might be expected to consider herbal medicine as pagan, are taking an interest in the study of herbal medicine.

The School of Natural Sciences of the University of Zambia is currently involved in a number of research activities. While conducting research on fertility-regulating plants, the researchers have come up with some interesting results from Aristolochia petersiana klotz which grows in the Zambezi valley. Its roots are soaked in warm water and the infusion is drunk to induce abortion. Research on pregnant rats has confirmed this therapeutic claim. Because of the interesting results which have been produced, the Division of Human Reproduction of the World Health Organization in Geneva has offered some financial support for this work.

Among the latest developments in research is a pilot study which has been designed to identify useful traditional medicines and to confirm their effectivess, with a view to introducing them into the national health-care system. The project is aimed at:

(a) Increasing knowledge of Zambia's commonly-used herbal medicines;

(b) Correcting any known deficiencies;

(c) Further developing useful practices;

(d) Enabling administrators to formulate realistic national health plans for future developments of the health services.

Detailed objectives of the research project. These are:

(a) To identify and record all known therapeutic traditional medicines in Zambia;

(b) To validate the therapeutic claims for these traditional medicines through scientific, laboratory, clinical and field research and studies;

(c) To publish and disseminate research findings;

(d) To recommend methods of production and application of the useful medicines for adoption and distribution throughout the country.

Finally it is hoped that a national pharmacopoeia containing plant and herbal medicines would be developed from the results of these research activities and studies.

The specific plan of action includes:

(a) Laboratory pharmacological research and studies on plants and herbal medicines;

(b) Clinical studies on traditional therapies among volunteer ambulant and hospital in-patients;

(c) Field research and studies, including the establishment of a herbarium and botanical gardens.

Pharmacological studies. The plant and herbal materials for investigation will be selected on the advice of traditional healers and herbalists. Their local vernacular and botanical scientific names will be determined with the assistance of a qualified botanist.

These investigations will include biological studies on animals, a therapeutic index and analysis of side effects. The dosage and effective methods of administration will also be determined before a particular medicament is introduced for general use.

Although the recipes recommended and utilized by established and reputable traditional healers will be followed, modern research protocol applicable to any new drug will be observed.

To avoid duplication of work, it is considered advisable to request the database of the University of Illinois at Chicago (NAPRALERT) to provide computerized materials indigenous to the Republic of Zambia in order to supplement material already available.

Pharmacological and other scientific investigations will be undertaken in laboratories that will be equipped for such purposes.

Clinical studies. Initially, efforts will be made to collect and record information on traditional health-care practices. This step has already been taken by health workers in some parts of the country, because the majority of the healers who are old and illiterate do not record their experiences.

The patients to be involved in the clinical studies will be volunteers to whom the purpose of the studies will be clearly explained before any medicament is administered. Care will be taken to make sure that no patient is put to any undue risk whatsoever.

Diagnosis would be made by western-trained physicians, and the traditional healer will administer therapy while the modern physician observes closely every step taken and the progress made.

Field research and studies. It is hoped that field research and studies, involving interviewing community leaders and heads of families, will be undertaken with the help of volunteers, research fellows and assistance drawn mainly from the student body of the University of Zambia.